TROUBLE IN MiG ALLEY

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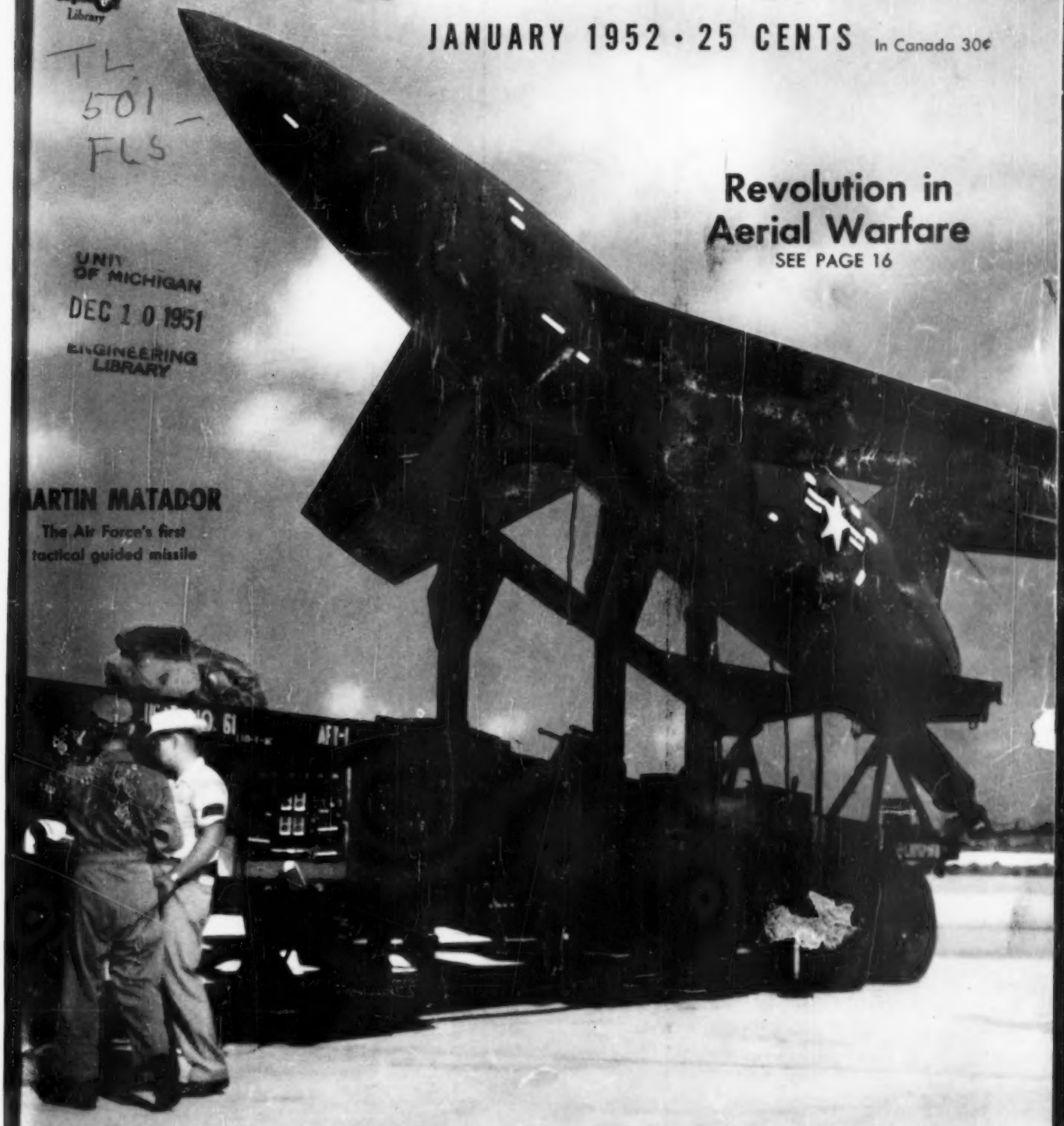

MEDIUM BOMBERS CARRY THE BIG PUNCH

SEE PAGE 9

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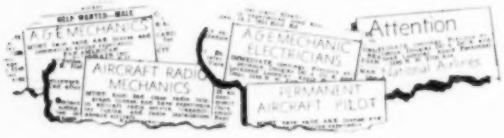

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TRAIN IN MIAMI — AIR CAPITAL OF THE WORLD

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MILITARY NEWS

STRATOJETS FOR KOREA

First all-jet bomber to see action in Korea will be Boeing's sweptwing *Stratojet*. The Strategic Air Command's MacDill AF Base near Tampa, Fla., received its first Stratojets in October and they were immediately assigned to the 306th Bombardment Wing, a Sixth Air Division training unit. They probably will be flown direct to combat units in Korea before a complete *Stratojet* Wing is formed.

B-29 BATTLE LOSSES

The B-29 has clearly demonstrated the fallacy of sending piston-engine bombers into a combat area where all enemy interceptors are jets in the 600 m.p.h.-plus class. The MiG pilots have exacted a heavy toll of B-29s sent out to bomb North Korean bases. With increased numbers of Russian-built MiGs appearing over MiG Alley, UN Forces are giving the B-29s more fighter escort during tightly-timed bombing runs. First true test of the MiGs' ability to knock down jet bombers will come when the *Stratojets* get into action.

ATOMIC ENERGY FOR AIRPLANES

"My belief is that our efforts to fly an aircraft on nuclear power will be successful," declared Dr. M. C. Leverett of General Electric's Aircraft Nuclear Propulsion project, in a recent address before the Chicago unit of the Institute of the Aeronautical Sciences. "One pound of uranium 235," he said, "will liberate heat, on undergoing fission, equivalent to the energy liberated by burning 1,700,000 pounds (about 284,000 gallons) of gasoline." Fuel consumption of an atomic-powered plane, he said, would be measured not in thousands of pounds per hour but in pounds per day. GE has been given responsibility for the nuclear propulsion plant and Consolidated Vultee for the airframe.

TWO NEW CORSAIRS

The seemingly ageless F4U *Corsair* **is** being given still another lease on life. Two new modifications of this World War II workhorse—the AU-1 for the Navy and the F4U-7 for the French—soon will roll off the production line. The AU-1, carrying a single-stage rather than a two-stage R-2800 engine, will be used as a low-level attack and close-support fighter. The F4U-7 is designed for high altitude missions. Performance figures for the two planes have not been released.

SAPPHIRE-POWERED CANBERRA

The British-designed, twin-jet *Canberra* (B-57A) to be built by Martin for the Air Force will carry the British-designed, American-built Sapphire turbojet engine, which is rated at 7,200 pounds thrust. The Rolls Royce Avon in the two *Canberras* delivered to Martin is rated at 6,000 pounds.

TWO NEW SABRE JETS

The new year will find two new versions of the North American *Sabre* in production. The F-86F will be produced in Columbus and the F-86H in Los An-

(*Continued on page 60*)

One of the first auxiliary gas turbine engines produced by AiResearch Manufacturing Co. under a $36,000,000 contract with the Navy Bureau of Aeronautics. The turbine will supply fast starting power for seven Navy turbojet and turboprop aircraft. Grouped around the engine are, left to right: Capt. J. E. Baker, Comdr. R. N. Gibbons, Walter R. Ramsaur, AiResearch vice president, and Comdr. J. O. Taylor. The plant is in Los Angeles.

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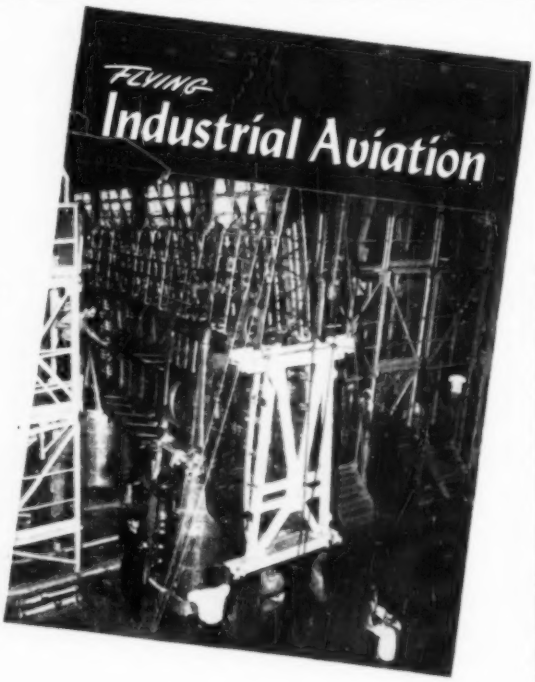

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JANUARY, 1952

In the event of full-scale war, air bases arrayed around the Russian perimeter, particularly on the western segment, would serve as springboards for hard, trip-hammer blows at the Russian heartland by medium bombers carrying atomic or blockbuster bombs.

Medium Bombers carry the BIG PUNCH

By ROGER GREGORY

A VAST HULLABALOO was raised in the land not so long ago when members of the House Armed Services committee discovered that there were "only" 87 B-36 superbombers ready for superbombing operations.

What the furore chiefly made clear is the too general tendency to assume that American strategic air might *begins* and *ends* with the B-36,—that is, with the heavy, intercontinental bombing plane.

For years now it has been little noted that the preponderant portion of the Strategic Air Command's deterrent power and retaliatory wallop are wrapped up in aircraft that passed in late World War II as heavy bombers but now are down-graded to the rank of "medium."

We are not talking now about strategic air versus some other kind of war, but about the tools with which SAC will deliver its weapons if there is a war, whether specific missions be called strategic, tactical, retardation or just plain preventive medicine.

Gen. Hoyt S. Vandenberg, Chief of Staff of the Air Force, has tried to show the tyrannical nature of such

Mainstay of our medium bomber striking force is the Boeing B-29, which has long range but is too slow for jet war operations.

expressions as strategic and tactical, pointing out that it is, as a practical matter, hard to divide up air power. Tasks of strategic and tactical air forces overlap and supplement each other but, the general says with an air of resignation, the habit is too well fastened on us to do much about it at this point. It is especially true of the new type mediums, the high-speed jets, that the dividing line between strategic and tactical may be difficult to draw.

Thomas K. Finletter, Secretary of the Air Force, has been trying to straighten out the record on what the bombing tools are. Recently when this reporter asked how long the detterent power of the B-36 and a-bomb combination could be expected to last, he said:

"I think you are over-emphasizing the B-36, because the B-36 is only part of our fleet." Besides that are the medium bombers . . . and that is an equally important part of our strategic (there's that word again) air attack."

This attack, the Secretary maintained, "is a force of such tremendous violence that there is the possibility that it and it alone could stop any agressor who might ruin our free society."

But it is not "just" the B-36. The record probably would show, if it were available for public scrutiny, that intercontinental bombers comprise about 17 per cent of SAC's bombing planes and less than 25 percent of its group strength. The mediums are the pluggers. They will be in on the first attacks and thereafter will keep the fields plowed and go after developing targets.

On Aug. 25, Finletter and Vandenberg formally introduced at the annual Air Force Association convention the new concept of "retardation." This envisions bringing "atomic power to bear directly on the enemy's ground forces." It stands with defeat of the Russian long-range air force at the top of SAC's list of priority tasks. Is it strategic or tactical? Or won't preventive medicine as adequately describe what is sought? In any event, the mission is tailor made for the post-World War II medium bomber, the high-speed, heavy-load carrying, jet-propelled monster that behaves with the nonchalance of a fighter.

Medium bomber is a term not as easily defined nowadays as in the past. In this transition stage in which jets gradually supplant reciprocating engine types, it is a bomb carrier that has less than intercontinental range, that is, it requires advance bases or aerial refueling; its speed ranges from 200 m.p.h. to sonic; it will deliver atomic bombs whether they are the "baby" types with an energy equivalent of 5,000 tons of TNT or city eliminators of five or six times the potency of the Nagasaki weapon; if the combat situation requires, the medium can do a handy job of anti-personnel work and battlefield isolation in darkness and daylight.

The types are (1) the B-29 *Superfortress*, which we have most of by all odds, (2) the B-50, which is the longer-ranging, faster *Superfortress*, and (3) the Boeing B-47 *Stratojet*, which is powered by six jet engines, has a 4,000-mile range without the benefit of air refueling and is the first production sonic-speed bomber anywhere.

The mediums one day will all be *Stratojets*, although the disconcerting fact at the moment is that there is no B-47 wing in the Air Force. Production schedules of course are secret, but the decision to establish three assembly lines—Wichita, Marietta, and Tulsa,—is a measure of the high importance of this airplane.

What the B-17 and the B-25 were to World War II, and the B-29 and B-26 are to Korea, the B-47 will be—and then some. It puts bomber speed in a fair way to compete with fighters, as the experimental model demonstrated at Andrews Air Force Base, Md., for President Truman and Members of Congress in February, 1949. That aircraft spanned the nation, from Moses Lake, Wash., to Andrews at an average speed of 607.8 miles an hour, covering the 2,289.5-mile distance in 3 hours 46 minutes.

It is worth noting in passing that the B-47 traces its origins to late 1943 and flew for the first time on December 17, 1947—44 years to the day after the Wright Brothers.

Military planners today, in contrast with the situation they faced two years ago, can project operations on the assumption that a gigantic system of overseas bases will be ready when and if there is world War III. But they also can derive comfort of a sort from the fact that aerial refueling developments transform all the mediums into intercontinental bombers if dire necessity forces that upon them.

This same refueling, moreover, increases the range of, say the B-47, operating from a forward base; for example it can take off light on fuel and heavy on bombs, and refuel aloft. The significance of this could be illustrated in

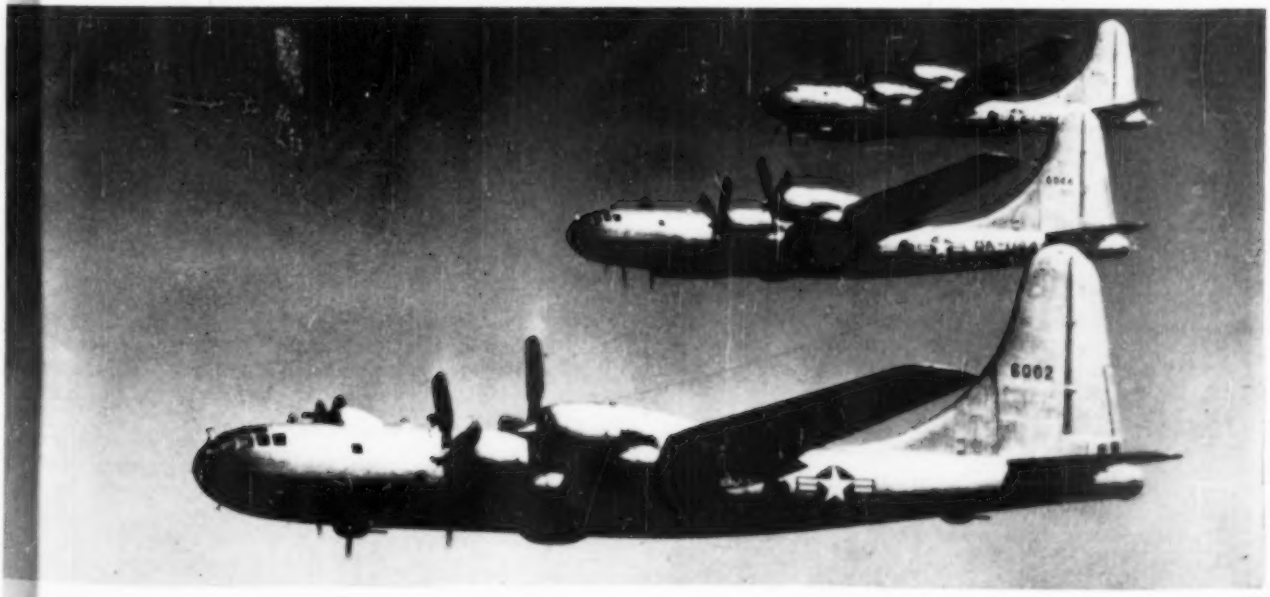
Newest "sweetheart" of Strategic Air Command is this Boeing Stratojet, a six-jet medium with the speed of jet interceptors.

numerous ways, one being the fact that on a routine bombing mission a B-47 will burn off 11 percent of its fuel from the time engines are started until it reaches cruising altitude. The range increase percentage is much higher than that, if the plane is refueled at that point.

While attention to intercontinental bombing plans has not diminished, two developments have enormously improved the overseas bases situation and thus the striking power of SAC's mediums. One was establishment of the North Atlantic Treaty Organization, bringing with it joint military effort. The other was the war in Korea which rubbed out much of the doubt about the urgency of the NATO projects.

Time was, and not very long since, when all the services were on short rations and European military power mostly did not exist. Then the Joint Chiefs of Staff conceived the intercontinental (*Continued on page* 46)

Third SAC medium is the B-50 (below), long-range, faster version of the B-29. Nose of B-29 (above, right) during Arctic maneuvers.



Trouble in MiG ALLEY

THERE is trouble in MiG Alley.

We pick up a newspaper and read the headline: "250 Jets Fight Biggest Battle, 8 MiGs Downed."

The story following the headline reads about as follows: "Nearly 250 Allied and Communist jets tangled Tuesday in history's biggest jet battle. Allied pilots destroyed or damaged 20 Communist jets. Eight MiGs were listed as shot down, two probably destroyed and 10 damaged. The Far East Air Force said three *Superfort* bombers and one *Thunderjet* fighter were shot down."

Such accounts of spectacular air battles, with UN and enemy planes tearing through the sky at 600 m.p.h. from tree-top level to 40,000 feet, make good reading and most readers probably would agree with the recent high-level statement that "we (UN air forces) are knocking the socks off them."

If "knocking the socks off them" means that UN forces hold the edge in numbers of airplanes shot down or damaged, then we are knocking the socks off them. Not many socks, but enough to give UN airmen the bigger end of the box score.

But there still is trouble in MiG Alley.

The big question in the minds of many close observers of the Far East air fighting is this: When so many jets are engaged in battle day after day, why is the percentage of planes shot down or damaged so low?

Other questions shape up about like this:

If UN fighter airplanes are equal in performance to Communist fighters but our gunsight is superior, our pilots are better trained and our air discipline is better, why are enemy losses per engagement so few?

Are enemy losses low because her pilots are too cautious and are "breaking off" too often in air-to-air combat?

Is the extremely high speed of today's jet fighter a drawback, rather than an asset, in effective air-to-air combat?

Are today's superb jet fighters carting into the air outmoded or ineffectual armament?

Is it too early in Korea, the world's first practical jet plane laboratory, for a definitive evaluation of the limitations of high-speed jets and air-to-air jet tactics?

These and many other questions are being asked. The answers? Military experts are now seeking them on testing grounds, in laboratories, and in the conference rooms of planners who determine concepts of air warfare.

Let's take a look at some of the problems confronting the pilot who must take his fast jet into MiG Alley and attempt to out-fly and out-fight an enemy pilot at the controls of an equally fast jet.

If he is flying a *Sabre* jet (F-86), he can close with an enemy fighter at 600 m.p.h. or faster. His opponent can match that speed. That means that the two planes are approaching each other at 1,200 m.p.h.

In such a head-on encounter, neither pilot can get more than a brief glimpse of the other and each has only a

When hundreds of jets tangle in air combat, why is the percentage of "kills" so low? Here are some of the answers

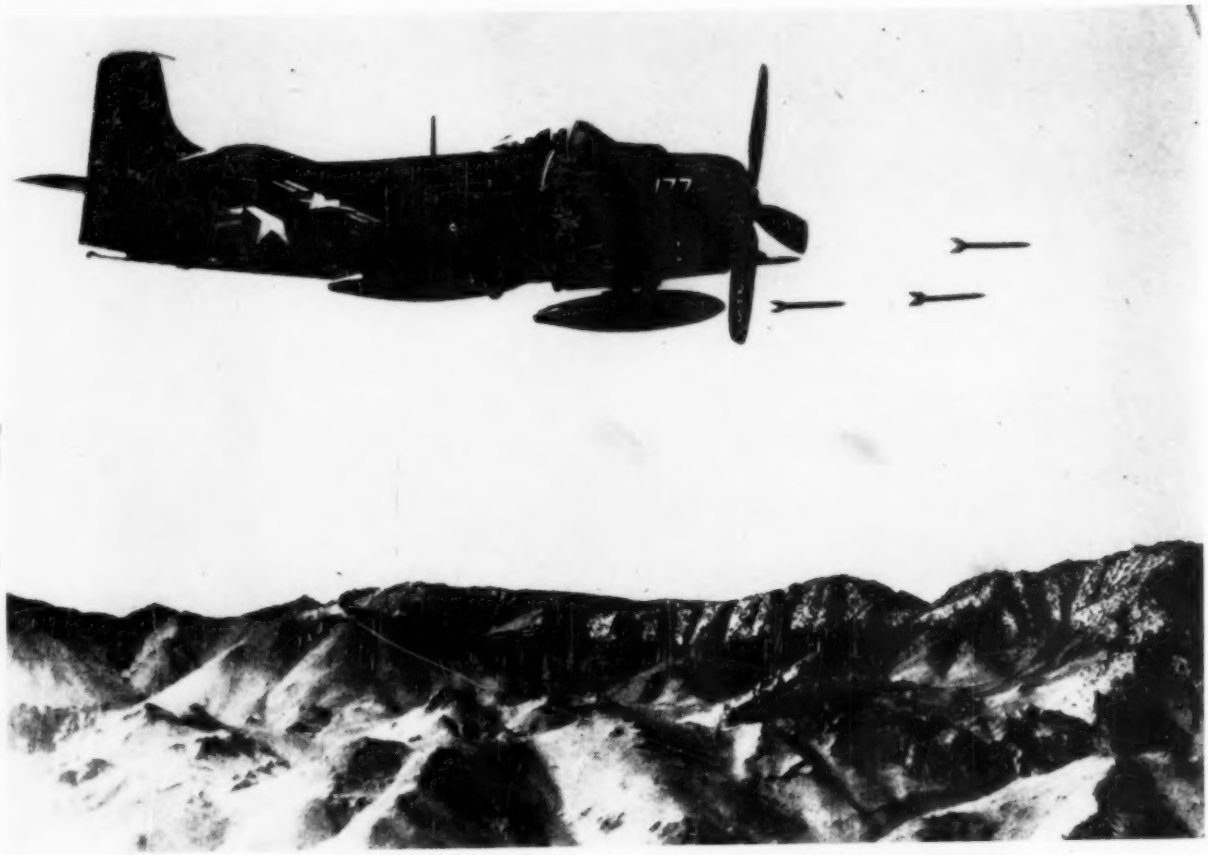
fraction of a second to sight and fire. One pass is about all that is possible in such circumstances. If neither plane is hit or if the hit is only superficial, the two pilots never see each other again that day. After that one pass at 600 m.p.h. the two airplanes traveling in opposite directions are soon out of sight of each other. The turning radius of high-speed planes is so great that the end of the turn would find the two airplanes 60 miles or more apart.

Even in a quartering attack, the pilot has only part of a second to get his sights on the enemy plane. If he misses, his speed soon puts him in another section of the battle sky where he must find another opponent. Or, if his fuel is running low, he must fly home.

The size of the target is another important factor. At the right range for his guns, the UN pilot sees with his eye a target that is quite small. At the same range, the target is much smaller on his computing gunsight. Add the element of speed, whether it is a head-on, quartering or tail attack, and the pilot's problem of knocking down his opponent is compounded. Throw in the element of poor visibility, which always exists at high altitudes, and the low percentage of kills comes into proper perspective.

UN pilots also work at a distinct disadvantage because of the area over which most of the big battles are fought. That's MiG Alley. It runs from Sinuiju on the Manchuria-Yalu River frontier to about Sinanju, which is 75 miles to the southeast. The Alley is all over enemy-held

Many observers believe the Sabre jet (pictured here in takeoff formation) needs heavier armament than the .50 caliber guns it carries.



One solution of the problem of improved armament for UN jet fighter aircraft may be the "Mighty Mouse," the first successful air-to-air rocket. It is shown here being fired from one of the Navy's *Skyraiders*.

territory. To reach MiG Alley, UN jets must travel long distances to get at the MiGs. Since most of our best jet fighters are fuel "hogs," the pilots flying them must always be conscious of fuel gauges. In many instances, UN pilots have time for only one or two passes before they must streak for home or run out of fuel.

That is a brief summary of the problems of American, British and Australian pilots as they carry the air war against the MiGs with *Sabres*, *Thunderjets* and *Meteors*. The boxscore of planes shot down is heavily in our favor, despite these problems, because of our superior computing gunsight, our tactics, our better trained pilots and the excellence of pilot discipline.

The caliber of American pilots' air discipline was clearly demonstrated not long ago when Republic *Thunderjets* streaking in to hammer ground installations with rockets and bombs were "jumped" by MiGs which had roared in under the *Thunderjets*' covering jets. Caught in an unfavorable position, the *Thunderjet* pilots jettisoned their rockets and bombs and climbed out to rout the MiGs. Pilots without the good discipline that is part of U. S. military air training might have been demoralized.

Another problem, and it appears to be the most important one right now, is fighter plane armament. Both UN and enemy jets can "take it." The ability of the MiGs to absorb hits and go on to fight has been reported repeatedly by American pilots, and it is an important factor in the comparatively low percentage of kills in any given engagement.

There is much soul-searching on the question of armament and something is being done (*Continued on page 54*)

The .50 caliber machine gun, standard armament of U.S. fighter aircraft, may soon be replaced by cannon or one of the new rockets.

Professor MACH and his NUMBER

By BILL BULLOCK

Professor Ernst Mach

Thirty-five years after his death, a backward schoolboy's name has become a number which is synonymous with supersonic flight.

Ever since transonic and supersonic aircraft were first announced, the term "Mach Number" has come into almost common usage in aviation circles. Since the term has appeared in FLYING *articles on new faster-than-sound planes and missiles, many readers have become curious as to its exact meaning and origin. In response to many requests, here is the story of Mach.*—THE EDITORS.

ALMOST 15 years before the Wright Brothers made history on the sand dunes at Kitty Hawk, North Carolina, a young German professor of physics at Prague University began experimenting with the ratio of the speed of flow of gases and the speed of sound.

His name was Ernst Mach, and he never saw an airplane that would fly faster than 100 m.p.h. He has been dead now some 35 years but his name is in daily use all over the world as a common term used to express the speed of fast jet propelled aircraft and rockets.

In his later years the good professor had expressed hope that the world would some day pay tribute to him as a physicist and philosopher. He would probably be bitterly disappointed to know that very few people even heard of him until the coming of the jet.

Mach's early experiments with the speed of sound were very crude. They were carried out with the help of a cannon borrowed from the Royal Navy. Mach had a theory that projectiles moving rapidly through a fluid formed a sort of cone which produced shock waves. To prove this, he set up condenser plates in a darkened area and attached them to batteries. Close by the plates he placed sensitized glass photographic plates. By firing the cannon shells past the condenser plates at different muzzle velocities, he actually caused the shells to take their own photographs as the sparks caused by the shells passing the condenser plates registered on the photographic plates. A careful analysis of these crude pictures proved that Mach was right, and that shock waves did exist.

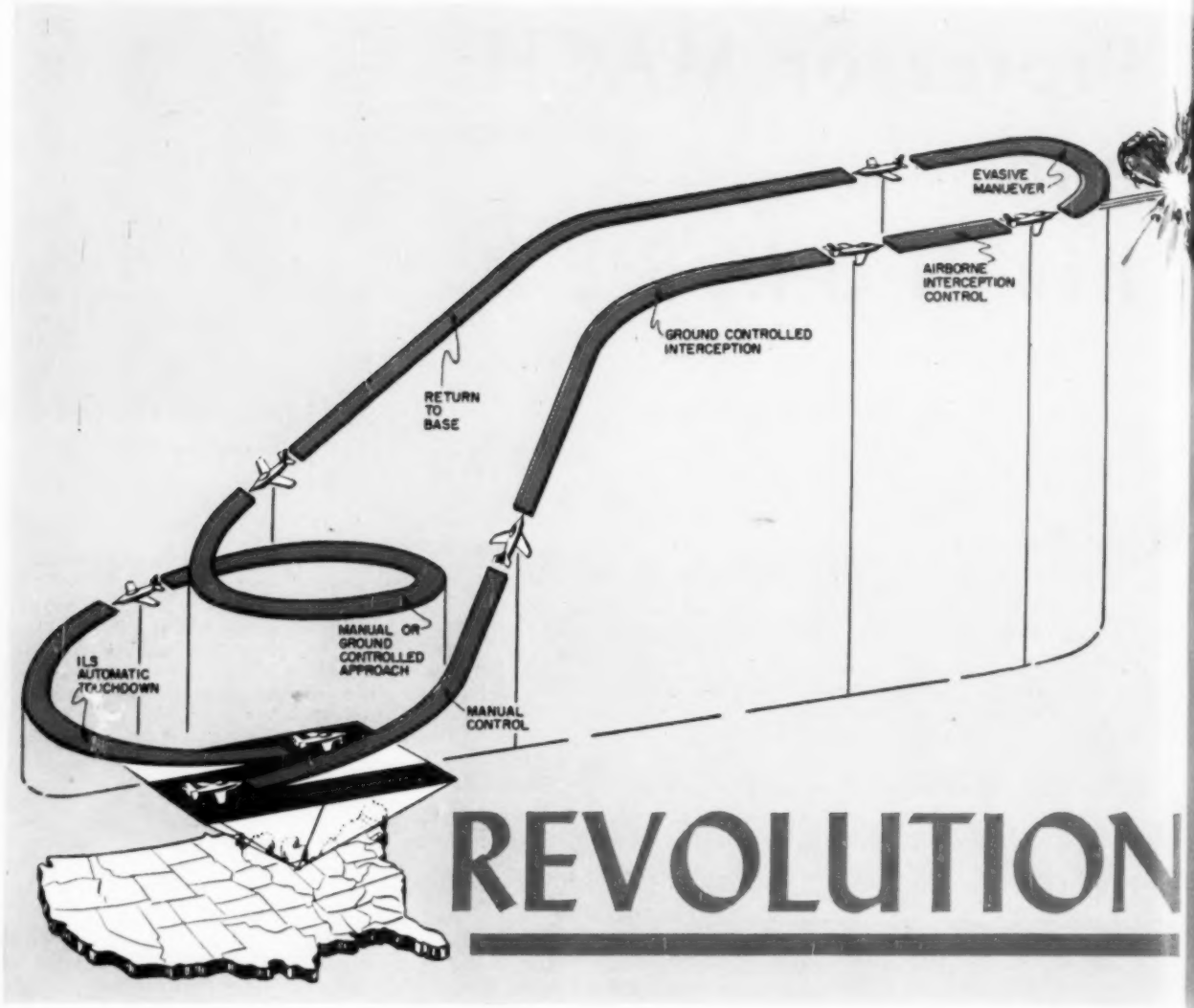
From these experiments came the term *Mach Angle*, and scientists throughout the civilized world used the term in their papers and experiments until just prior to World War II when the term *Mach Number* was adopted by engineers working on the development of high-speed propeller driven airplanes.

With the coming of the fast jet fighters, aircraft engineers began to attach much more importance to Professor Mach's experiments.

In designing and testing high-speed jet airplanes—and propeller-driven airplanes—that fly at speeds approaching the speed of sound, it becomes increasingly important that accurate computations of stresses be made. As an airplane approaches the so-called *Sonic Barrier* strange things begin to happen. The air which normally flows smoothly over the surface of the wing begins to pile up and form a solid barrier. This condition causes severe buffeting of the aircraft, and in some cases has caused complete disintegration! As the aircraft attempts to crash the barrier, much difficulty is experienced with the controls.

Gene Mays, veteran Douglas Aircraft Company test pilot who flew many of the early tests on the Navy *Skyrocket*, and was the first human to ever fly faster than sound at sea level, reported that the airplane had a tendency to roll to the right and left, and that the controls were extremely hard to move. Once through the dreaded barrier, however, things were smooth and there was practically no noise save that of the jet exhaust which seemed to be miles behind him.

Without becoming involved in (*Continued on page* 58)



WHILE TRUCE talks drag on in Korea, America is quietly testing one of her most closely guarded military secrets, one that will transform American fighter and interceptor aircraft, already exceedingly lethal, into the most deadly weapon ever sent aloft. Briefly, this new aerial weapon is automatic flight-control fire-control and, when incorporated in United States military aircraft, will ensure an almost 100-percent "kill" probability, causing a revolution in aerial warfare.

About the middle of July, 1951, while U.N. representatives and Communists argued at Kaesong, a lone United States F-86D *Sabre* jet (the first of this new version to appear in Korea) took off from an airfield near Seoul, flew to an area slightly south of the Yalu River, and shot down a Russian MIG-15 jet fighter.

This kind of thing, of course, has been happening with encouraging regularity. The startling fact about this unpublicized flight, however, was that the *Sabre* contained no trained pilot! The entire mission was accomplished by a Signal Corps colonel, who had *never before* flown an airplane, working in close conjunction with ground direction!

Let us digress slightly for the sake of historical background. Although the United States Air Force may dispute the statement and uphold the P-51 *Mustang* as the best World War II fighter, in the last analysis the British *Spitfire* probably surpassed the *Mustang* as the most effective mass-produced fighter and interceptor developed during the last war. Equipped with radar (one of the three important weapons developed during World War II), the *Spitfire* almost single-handedly upset the German Schlieffen plan for the invasion of the British Isles, massacred the Luftwaffe, won the Battle of Britain, and changed the subsequent pattern of world history. No other airplane has such a distinguished record.

Germany, of course, developed several types of experimental jet and rocket-propelled aircraft, but they were manufactured either too late or in such limited quantity that they failed to play a decisive role in the war. But equipped with automatic flight-control fire-control equipment, the North American F-86D, Northrop's F-89 *Scorpion*, Lockheed's F-90 and F-94, McDonnell's F-88 *Voodoo*, and Convair's deltawing F-92 (perhaps the most potent of the lot) should strike like spitting cobras against the Russian jets sweeping down through MIG-alley.

Not since Nazi Germany introduced the famed Me-262 and the rocket-propelled Me-163 (which, if used effectively and if developed soon enough, could conceivably have swept Allied bomber formations from Europe's skies) have fighters had such lethal potentialities.

Even an untrained fighter pilot could score almost 100 percent kills using automatic flight-control fire-control.

By VICTOR BLACK

in AERIAL WARFARE

For the first time in the history of aeronautics, the design of military airplanes has reached the point where the man at the stick is incapable of complete control. The characteristics of military aircraft have continued to improve as part of man's general technological advance. But the pilot is a different matter. Man's "design" has not changed perceptibly in thousands of years, nor is it likely to do so in the immediate future.

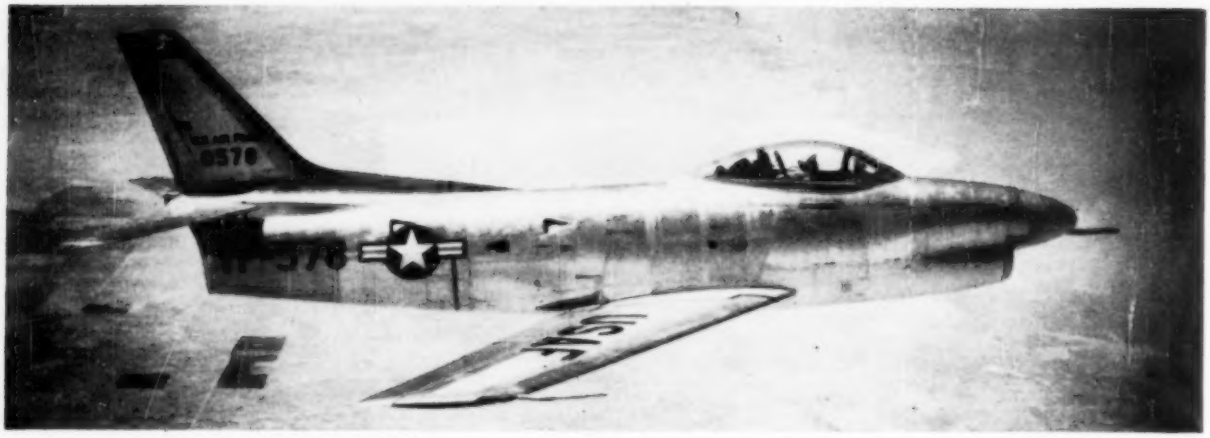
Airplane designers, therefore, were confronted with a new and difficult problem, certain to become increasingly important in the future. Operating speeds of today's military aircraft have made the reaction time of the human body a stumbling block in the pathway of progress. The pilot, for example, could not see a target soon enough to identify it and shoot it down. Neither could he respond quickly enough to make required tactical maneuvers. As Dr. N. E. Edlefson, chief of North American Aviation's flight-control fire-control project has stated: "The airplane of today simply blasts through space faster than the human mind can think."

The increasing trend toward the mechanization of pilot functions is easily shown by the evolution of the military airplane. The World War I bomber, by present-day standards, was a joke. The pilot usually threw bombs out of his plane by hand. In World War II, automatic gun turrets, autopilots, radar, the bombsight, and automatic landing equipment incorporated in bombers were a tremendous improvement. The guided missile, of course, will eventually eliminate the fighter pilot.

An interim weapon, however, between World War II aircraft and guided missiles will be the installation of automatic flight-control fire-control equipment in all American interceptors, night-fighters, and penetration fighters.

When Air Force Capt. Richard Creighton flew his F-86 *Sabre* from San Francisco to Los Angeles in 32 minutes and 56 seconds to set the present speed record for this intercity flight, he had to line up his airplane with the Los Angeles tower by radio while still many miles away. Averaging 625 m.p.h. for the flight, Captain Creighton could not wait until he saw the field tower over which he was to fly in order to officially complete his speed run. For if he were only slightly off course, he would not have time to correct it if he waited for his own vision to tell him his position with respect to the tower.

In a combat situation, if Captain Creighton had been approaching an enemy fighter, each flying at 600 m.p.h., we can imagine how much more complex his problem would be than aligning himself with a large airport. The distance between them would diminish at the rate of 1,760



The fast, hard-hitting North American F-86, best Air Force air-to-air combat plane to see action to date, would strike like a spitting cobra when it is equipped with the new automatic flight-control fire control equipment now under flight test development.

feet per second. A mile in three seconds!

On a collision course, the distance between the two airplanes would be about 2½ times the length of a football field before a well-trained pilot could press the button to fire his guns or rockets, once he had determined the nature of his target. But when he was close enough for positive identification of the target, and in the absence of automatic equipment, it would be too late to fire the guns.

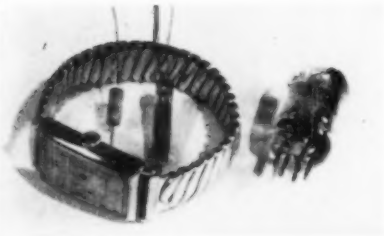
A major Southern California aircraft company has spent several years working on automatic control systems for aircraft as a solution to this problem. The Air Force has continued to pour large sums of money into the project which, if not successful, threatened to halt the rational advance of military aircraft design. In this light, the flight of the lone F-86D and its subsequent shooting down of a Russian jet fighter was one of the most important flights in aviation history.

The typical interceptor mission is pretty well stereotyped. It begins with take-off and includes climb to altitude, cruise to target, attack on target, return to base and landing pattern, then actual touchdown. There is nothing new in this. *What is unique, however, is that in the near future the mission will be accomplished automatically.* The pilot will do nothing more than press buttons to supervise the action of his airplane in various phases of the mission, and even this will eventually be eliminated. As a matter of fact, the man in the airplane will be more of an observer than a pilot. He will be along merely "for the ride." Although the era of push-button warfare is still on the distant horizon, we certainly are on the threshold of a new era in automatic control.

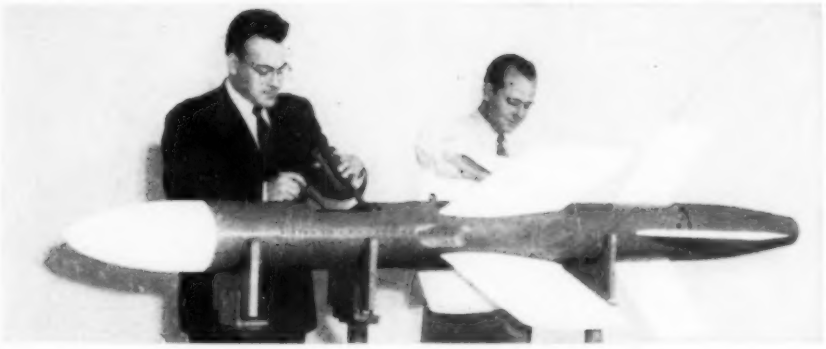
There was a time not too long ago when the airframe was designed first, after which the auxiliary equipment—communications, radar, armament, auto-pilot, and fire control—could be purchased "off the shelf" and then installed. The requirements of the new interceptor, however, relegate the airframe as an accessory to the interceptor system. The whole of the airplane must be carefully integrated into the flight-control fire-control system.

The automatic control systems now being installed in America's newest interceptors and fighters will navigate the airplane into proximity of (*Continued on page* 54)

Another first-line jet plane which may see its first action with the flight-control fire-control aid installed is this sweptwing penetration fighter, Lockheed's rugged, long range F-90. It is powered by two J-34 axial-flow engines, and is one of largest jet fighters.



Guided missiles engineers are compressing radar into packages so small that it takes jeweler's tools to put the parts together.



RADAR in miniature

FLYING RADAR STATIONS for use in extremely advanced-type aircraft are being built experimentally at Ryan Aeronautical Company in "packages" so small they could almost fit into your brief case or handbag.

These new subminiature radar stations represent the ultimate in the years-long effort to shrink them to an absolute dimensional minimum. Huge radar installations with parabolic scanning units the size of a parachute canopy have been reduced in size to fit into a bulbous radome like that between the two fuselages of the F-82 *Twin Mustang* or enclosed in a Northrop F-61 *Black Widow* night fighter. Then such radar units were compacted into still smaller space, and compressed again and again to fit into packages of ever decreasing dimension.

In the latest unit, an electronic brain with the same uncanny, instantaneous information-gathering and transmitting ability of huge radar installations on ships and military bases ashore, has been crammed into an amazingly small space. Its only limitation is the range the information can travel. Otherwise, this creature of a modern-day Lilliputian world has all the potentialities of electronics giants.

Tubes, resistors and coils no larger than a fingernail, a paper clip, or a key are packaged amidst an intricate maze of wiring, some strands as slender as 3 1000ths of an inch. The cylinder housing the brain is likely to be less than a foot in diameter and perhaps two feet long. Within the confines of that space, thousands of "messages" can pour in every second as the aircraft speeds through the thin upper air.

The flying radar station consists of an "intelligence" head, electronic circuitry, and a power supply section which provides the various voltages required.

The "brain" contains the transmitter and receiver. It transmits energy which, when reflected back, is received by a midget antenna equivalent to the "dish" style antenna of large radar installations. This data is supplied to the electronic circuitry, where it is amplified and "analyzed."

The information carried in the reflected energy, or "echo," is channeled to two places after it is extracted by the electronics circuitry. The "brain" is given the data it needs to determine the navigation required, and at the same time, the controls of the aircraft are instructed on adjustments needed to guide the vehicle.

Not only is the compact subminiature radar station as intricate as its larger brothers on ships and ashore, or the "medium" sized ones in such planes as the Grumman *Guardian*, but it must be completely automatic in operation for space limitations do not permit an operator to be aboard the vehicle to supervise the functioning of the radar installation.

One of the major problems confronting engineers in designing a workable subminiature radar station and electronic brain is that of temperature control. It is important to maintain relatively stable temperatures to avoid changing its characteristics. Closely packed electronic tubes and their associated parts get extremely hot. Arrangement of heat-conducting chassis to reduce excessive temperatures to safe levels presents a major challenge. However, since the life of a subminiature radar station is short because of the nature of its mission, higher than normal temperatures can be tolerated for short intervals.

At high altitude the tempera- (*Continued on page* 56)

"I began checking below for possible emergency clearings. There weren't any. Solid jungle, 45° slopes was all I could see."

KANAKA AIR LINE

Gibbes Sepik Airways now has eight *Norseman* aircraft to replace the original tiny puddle jumpers that pioneered the way.

Flying payloads deep into New Guinea's highlands is rugged and risky but profitable.

By W. WARD VICKERS

I SAT in a little clapboard line-shack alongside a former military strip in New Guinea while we waited for weather to lift over the first ridge. Down here clearance for weather en route amounts to if-it-looks-like-you-can make-it-try-it.

Pete Howse, the manager of Gibbes Sepik Airways, was reminiscing about their back country flying:

"Me and Bobbie Gibbes were coming outta Garoga with a load of Kanaks for plantation labor. We packed sixteen o' the beggars into that *Norseman*. When Bobbie came out to the plane and I handed him the cargo sheet, he climbed all over me.

" 'Thought there was only sixteen, what's this seventeen?' he grumbled.

" 'You better recount,' I told him. So Bobbie stuck his head in the door and counted again. Next he turns around all smiles.

" 'Well, then sixteen plus!'

"One of the 'Marys' had just delivered number seventeen on the cabin floor," Pete went on with a chuckle.

I could see through the door that the weather was still perched on the distant ridge. Since Pete was in a talkative mood, it was a good opportunity to ask him some questions about the company. It was a real "bush" line story if I ever heard one.

Bobbie Gibbes came home to Australia after the war. He had been a wing commander. He'd been through the whole show against Rommel. He not only wore practically every air medal the British offer, but also could claim ten and a half Jerries, if anyone doubted his ability.

He bushed around Aussie for awhile, then came to New Guinea to fly for one of the local lines. After a couple of months, he bought an *Auster*, a light 130 horsepower British made plane with a 600-pound payload. A buddy, Bruce Brearly, became the mechanic, and Pete Howse the manager. They formed a charter company and named it after the Sepik River. Bobbie flew the hide off that first plane, averaging some 160 hours a month. This was way back in 1949.

In a matter of months the "kite," as Aussies call them, had paid for itself. The company bought another. One of Gibbes' old squadron mates became the pilot. Planes number three, four, five and six soon arrived, all *Austers*. They began opening up the back country, making their own strips in places where only jungle existed before.

"We Fly Anything, Any Place, Any Time" the company advertised, and added verbally "to hell with the regs."

About this time the Australian Government decided to try and open up the hitherto uncontrolled areas. In the interior New Guinea highlands the natives were, and still are, as wild as they were 1,000 years ago. Camps were located in favorable areas and armed patrols would venture into unexplored regions. Planes were needed to fly supplies and men into these remote places.

"As I climbed out of the cabin at Tapini Airport, the plane was quickly surrounded by a bunch of bare-skinned natives."

Well, as might be expected, the six *Austers* are now stacked up on scattered isolated strips—the term "strip" being very loosely applied here. The result? Gibbes Sepik Airways now has eight Canadian-U. S. made *Norseman* aircraft, paid for by those original tiny puddle jumpers that pioneered the way. Business is booming. A *Lodestar* is also in operation. Two large modern craft will be purchased from the States at the end of this year. The mechs, pilots and office personnel are all buying stock in the outfit and if enthusiasm is a yardstick for success, the Kanaka line is on its way.

They're all pulling together and the funny part is half of the personnel are "New Australians," or immigrants and D.P.'s of every nationality. Look at the pilot roster. There is Frank Wiza, ex-Polish Air Force; Remus Zuydam and Frank Goosens, two Dutchmen who were former KLM pilots. Bobbie Gibbes and Nick Barr are ex-Royal Australian Air Force, while Bob Bell flew for the New Zealand Air Force.

These are as good as you can find. They've got to be good in this country. Wiza has over 7,000 hours. He saw the battle of Britain and ended the war with a hat full of medals from every country this side of the Rhine. Nick Barr's wartime record shows eight Jerries dropped in thirty-two operational hours. The two Dutchmen were trained back in the U. S. A., and they have nothing to be ashamed of. I know. I flew with Frank Goosens.

As Pete and I continued talking in the line shack, and he was about to tell how they "pranged" the fifth *Auster* climbing out of a blind canyon, Goosens walked in the door. He was big and rugged looking with a friendly smile and easy going manner. He interrupted the conversation gaily.

"Any similarity between chart and terrain around here is purely coincidental. The Owen Stanleys are quite a place for trial and error." Then almost in the same breath, "Let's try to get into Tapini."

That's where I was headed on a photographic expedition. I would see bush flying of the first order.

The *Norseman* was loaded to the overhead.

"Took all the radios and extra gear out to increase the payload," Frank commented as he climbed into the cockpit.

I sat down beside him and, for the first time in over a year, felt the old familiar yoke in my lap.

We taxied out and checked the mags.

"Take her off if you want," he suggested.

As eager as a kid that had just found his long lost roller skates, I hit the go-handle. First she toddled, then went hurtling down the runway, not too anxious, but eventually horsing off.

We banked around and headed for the interior highlands. The terrain climbed about as fast as the heavily laden *Norseman* and soon we were skitting over peak and cloud.

From old single-engine habit, I unconsciously began checking below from time to time for possible emergency clearings. There weren't any. Solid jungle, 45° slopes, or both, was all I could see.

"What happens if that thing stops going?" I shouted, nodding toward the roaring Pratt & Whitney.

He just shrugged his shoulders nonchalantly and looked at me with a "you-guess" smile.

After an hour or so giant ridges began to crowd in on all sides of us. "Looks like this (*Continued on page 57*)

Have you a STEPCHILD in the COCKPIT?

By R. F. SANDERSON

Your magnetic compass still has a job to do for you despite all the new navigation devices.

THIS FORGOTTEN and neglected fellow is tucked away somewhere in the center of your instrument panel. His modest little two-inch dial is dwarfed by crackerbox-sized radio equipment and assorted instrument dials as large as alarm clocks.

His name is "magnetic compass," (FLYING, June, 1951). He is fast becoming the stepchild of navigation. There is a widespread conspiracy afoot to disinherit him in favor of radio.

With so much emphasis now being placed on omni, VHF, ADF, VAR, and ILS, we must not be surprised if latter day birdmen automatically catch the idea that the magnetic compass is an antique, an ineffectual pensioner from biplane days, included on the instrument panel only out of deference to past services and not to be relied upon in the progressive present.

Some extremists will even assert that the compass is thoroughly fickle, a sporadic liar to be doubted at all times. Airplanes today, they imply, carry around radio equipment worth a thousand dollars solely to keep that naughty little gremlin compass in line. Certain aviation circles regard compass as suspiciously as an inaccurate navigation chart.

Unfortunately for those who slander the magnetic compass, as directional equipment for navigation we have no satisfactory replacement. Radio at present is utterly incapable of completely taking over the duties of the compass; both have unique and clearly defined duties.

This article will not attempt to whitewash the compass. It is probable that the average compass in the average

Illustrated by Don Moss

The magnetic compass is even more sensitive than the altimeter. It's very upsetting to him when pilots have no confidence in him. Often neglected for newer instruments, he is rebuffed and ignored even when offering sound advice. It's not that he wants to run the plane alone. He just wants to work with the rest as a full-fledged panel member.

plane today is not a completely reliable pathfinder. However, this is not the inherent fault of the compass. If the engine suffered from similar neglect, the airplane could not even take off. Pilots and owners ignore compass troubles with an almost criminal indifference. It is small wonder that an instrument untouched and unchecked for three or four years or more may be off a few degrees on more than one heading.

The truth is that the average compass receives less maintenance than a goldfish bowl. When the liquid gets low, it is refilled (sometimes). When the glass becomes too dirty to see through, it is cleaned. This is the same care a goldfish bowl gets, only the goldfish get it more often.

Compare this to the attention accorded other aviation equipment. Mags get checked at every take-off. Spark plugs are jerked as soon as points burn. The radio goes into the repair shop whenever it shorts or statics. Ship and engine both are carefully inspected and brought up to snuff every hundred hours.

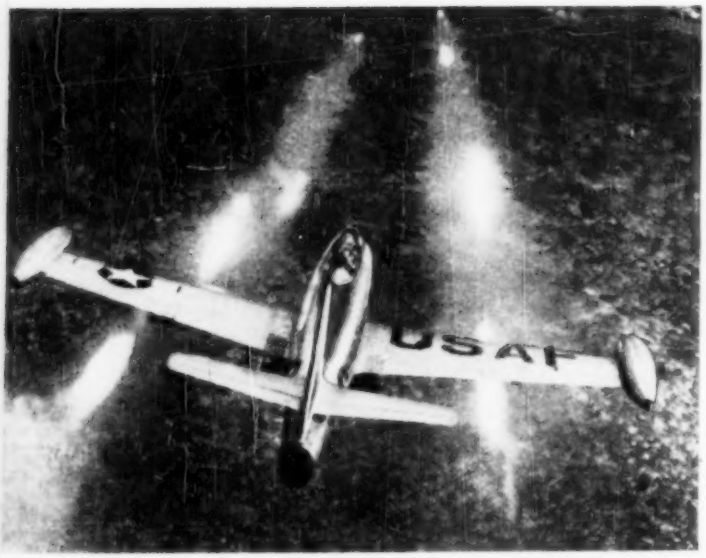
And the compass? While the airplane itself goes through three major overhauls, the compass gets no more attention than the aircraft manufacturer's decal. If there is one on the ship somewhere it is O.K. It is simply assumed that the compass is not exactly accurate, and the matter let go at that.

Unfortunately, this sort of compass neglect is at its worst in training ships. It is no wonder that fledgling pilots develop deep suspicions about compasses in general. If the training ships themselves suffered from equivalent neglect, the surviving students would quit flying altogether.

Our impressionable student on his first cross-country flights, with the encouraging approval of his instructor, winks at the compass and flies from A to B with the help of railroad tracks, rivers, terrain, (*Continued on page* 62)

The USAF's potent F-84E fighter with two 1,200-pound rockets, 12 HVAR rockets and six .50 caliber machine guns.

MULTI-PURPOSE



Eight high velocity rockets (above) concentrated on a target. How Tiny Tim rockets are installed (below) on wing of the rugged F-84.

THE SUSTAINED performance of only one aircraft—Republic's *Thunderjet*—has effectively disproved the theory that each plane type should be designed and used for a specific role or mission. Its record in Korean battle skies has proved to the satisfaction of most military airmen that the multi-purpose jet fighter is here to stay.

This rugged jet was sent to Korea in December, 1950, to strengthen air support for hard-pressed UN ground forces, whose leaders had been clamoring for additional tactical air power. The primary mission of the first contingent of *Thunderjets*, the 27th Fighter-Escort Wing, was the destruction of enemy equipment, supplies, troops, rail and vehicular networks, bridges and tunnels. It was close air support that often decided the difference between defeat and victory.

Working with F-80s, F-51s, F4Us and F9Fs, the hard-hitting *Thunderjets* (F-84E) performed this support role with devastating effect day after day, while Sabre jets carried the load of air-to-air combat against the MiGs.

Ground crew pulling a tank of napalm into loading position, as a *Thunderjet* is prepared for another mission against the Communists.

Thrust forward by its powerful engine, a *Thunderjet* takes off for another strike against enemy ground targets in Korea.

JET FIGHTER

Thunderjets hit ground targets, escort bombers, strike at enemy fighters and fly reconnaissance.

But that is only part of the F-84 story. In addition to its support mission, the *Thunderjet* has flown bomber escort, armed reconnaissance, interdiction and air-to-air combat sorties.

Its most damaging blows, however, have been delivered against the Reds "down on the deck." Flying through the soupy, treacherous Korean weather, *Thunderjet* pilots have:

Flown more than 25,000 sorties and logged more than 54,000 hours.

Put out of action more than 30,000 enemy troops.

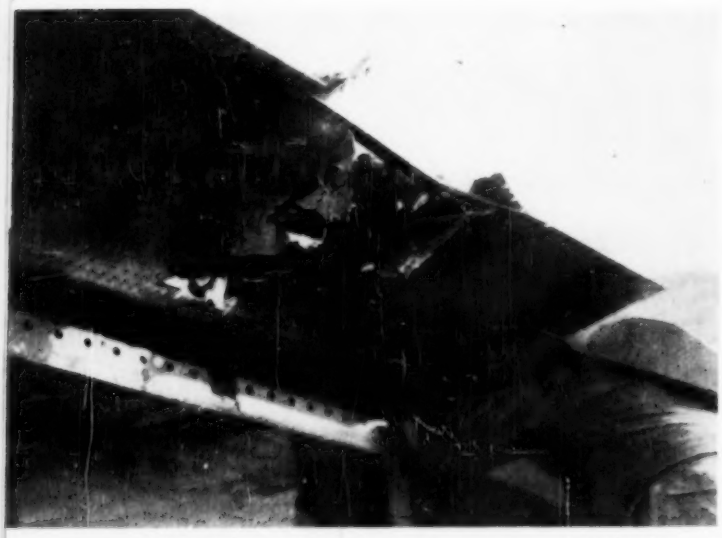
Leveled more than 25,000 enemy ground installations.

Destroyed approximately 800 tanks.

Capt. William O. Cottingham (above) telling how his F-84 was hit by enemy 20 mm. shell. Below, F-84s of the 49th Wing in Korea.

Assembly line technique in Korea. Belts of neatly draped machine gun ammunition are delivered by truck direct to fighter aircraft.

The ability of the Thunderjet to "take it" and come back is clearly shown in these photos of battle damage in the Korean theater.



Skilled mechanics (below) keep F-84s in Korea ready to fly when they are needed. Technicians are patching a damaged tail section.

Wrecked more than 300 bridges.

Fired one round of .50 caliber ammunition for every second of every day.

Averaged 3¼ *Thunderjets* every hour of every day over enemy-held territory.

Averaged 7.3 combat hours for every hour of every day.

Dropped a ton of explosives every 45 minutes of every day.

Dropped napalm fire bombs whose temperatures, if concentrated into a single mass of flame, would total 13,280,000 degrees F.

In air-to-air combat, the Air Force *Thunderjet* wings have destroyed eight Russian-built fighters (seven MiGs and one Yak), probably destroyed six, and damaged 25.

Gen. Hoyt S. Vandenberg, Chief of Staff of the U. S. Air Force, writing in the Feb. 17 issue of The Saturday Evening Post, paid this tribute to the F-84E: "An all-purpose plane that can do everything better than a piston-engine plane, including close support."

The *Thunderjet* introduced the Communists to the 11.75-inch, 1,200-pound Tiny Tim rocket. The first Tiny Tim assaults took place Jan. 19 and 20. On the first day, four F-84s each packed one of the rockets aloft for delivery on Red positions. On the second day, using Jato for takeoff, four more 84s hauled up eight Tiny Tims and fired them against concrete hangers at Wonsan.

It also was the *Thunderjet* which gave Sperry's new electronic computing gunsight its first combat test in Korea. The very first *Thunderjets* to thunder into action (Dec. 7, 1950) carried the gunsight and they have been using it ever since. Called a "triple-threat" device, the gunsight has been used effectively against enemy fighters, on ground support missions and during armed reconnaissance flights.

The same airplane was the first to take the jelly bomb into action in Korea. F-84s have since dropped hundreds of the tanks of sticky stuff, burning out troops concentrations and area where enemy vehicles are hidden and skipping them into remote caves harboring enemy bands. The fire bombs also deal effectively with guerillas. On the ground the GI is constantly trying to distinguish between friendly civilians and guerillas. From the air tell-tale activity makes the (*Continued on page 62*)

High on the priority cargo list on the supply lines into Korea are powerful jet engines for F-84 and other jet fighters in Far East.

Successfully flown for the first time on October 5, 1951, the new Convair-Liner will be flying for the airlines early this year.

The 340

The latest thing in luxury airliners features two engines, not four.

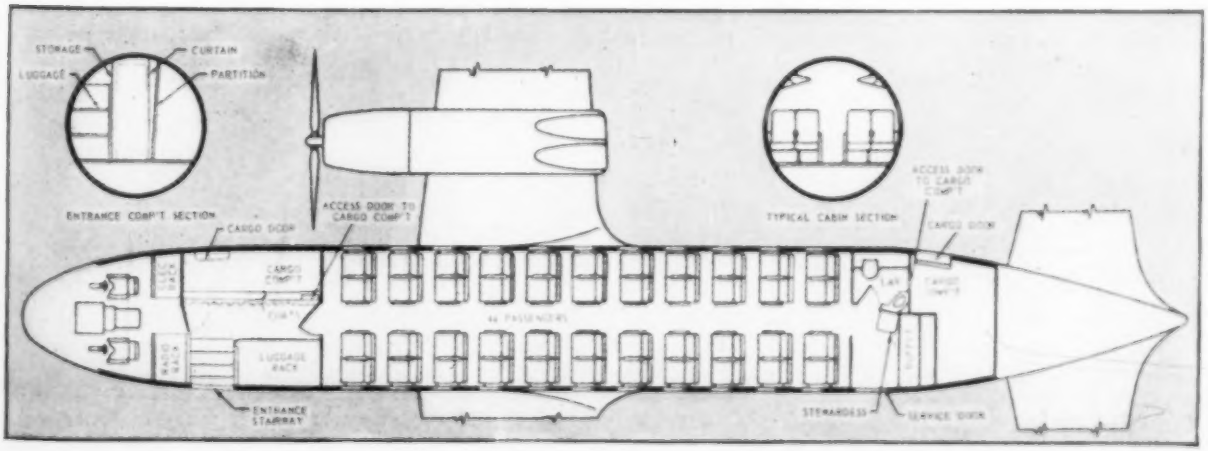
Convair	340	240
Length	79 ft. 2 in.	74 ft. 8 in.
Height	27 ft. 9 in.	26 ft. 11 in.
Wing area	920 sq. ft.	817 sq. ft.
Wing span	105 ft. 8 in.	91 ft. 9 in.
Fuel capacity	1,700 gals.	1,550 gals.
Gross weight	45,000 lbs.	41,790 lbs.
Wing loading	48.9 lb./sq. ft.	49.5 lb./sq. ft.
Maximum payload	11,632 lbs.	9,300 lbs.
Cruise airspeed @ 16,000 ft.	280 m.p.h.	272 m.p.h.
CAR take-off runway length	4,020 ft.	4,250 ft.

AS AMERICA'S largest and newest twin-engine transport goes into service early this year, the four-engine equipment is going to be on the receiving end of some stiff competition. The increased wing area, power and fuel capacity of the Convair-Liner 340, modification of the 240, provides for maximum versatility and utility.

Floyd B. Odlum, Board Chairman of Consolidated Vultee states: "We have designed the 340 to meet the needs of many airlines for a modern high-speed transport with maximum performance flexibility. The design innovations will enable the airlines to employ the 340, not only for medium-range schedules, but also as an alternate plane for four-engine equipment, providing the high speeds and comfort offered by long-range transports."

Although the high-speed pressurized transport is based on the design of the 240, it has undergone some radical changes and redesign. It cruises at 280 m.p.h. with a full-load range of 545 miles. The wing area is greater, the fuselage longer, gross weight higher and the engine more powerful.

The 13 per cent increase in wing area is one of the most important innovations in the (*Continued on page* 43)



Where are FRANCE'S COMBAT PLANES?

By mid-1952, 40 Dassault MD 450s a month will be entering service. Nene turbojet creates speed of 612 m.p.h.

By WILLIAM GREEN

French aircraft production has long been stifled by its government and manufacturers but its future looks bright.

WHAT HAS happened to the French aircraft industry? In 1945, every sign indicated a commendable rebirth of an industry that had been stifled throughout the war years. Long-promised French-designed combat aircraft have failed to materialize.

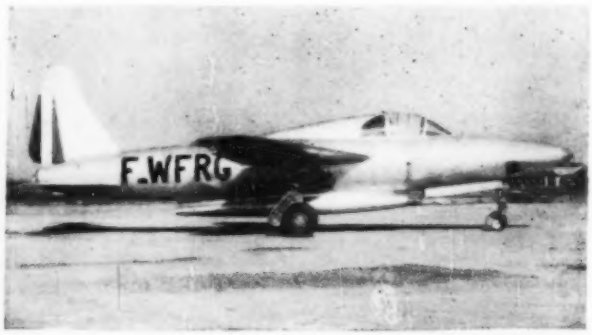
Accusations have been leveled against the French for seriously jeopardizing the Western Defense Assistance Program. It is felt that maximum effort has not been expended by the French toward doing their share to strengthen Western air power. With the exception of a very small quantity of British-built *Vampires* and F-84 *Thunderjets*, combat elements of the Armée de l'Air have been forced to fly a heterogeneous collection of outmoded and obsolescent airplanes left in the wake of World War II.

Members of the WDAP are very concerned about the fact that the French airplane industry has failed to make any real contribution to the Western defense build-up, when on the surface it appears that their ability and production capacity undoubtedly exist.

It has been too easy to place the whole blame for this state of affairs on the French airplane manufacturers, since they have placed exaggerated emphasis on a phenomenal prototype construction program and have sacrificed quantity production of effective combat airplanes. However, only a part of the blame can be laid at the doorstep of the industry. The lack of direction and coordination at the highest levels is primarily responsible for the procrastination and dabbling that has taken the place of clear-cut policy and assembly lines in the last six years.

The hiatus of the war had left French design teams far behind technical progress abroad. It was to be expected that the French Air Ministry would encourage the sensi-

With second prototype complete, tests have begun on *Arsenal* VG-90. Unusual feature is 25° swept-wing, mounted in shoulder position.



New versions of the troublesome *Espadon* are being tested. SO 6025 is one of two models which has rocket boost for climb in combat.

Sud-Est plants, instead of mass-producing their *Grognard* (shown above), will probably build the British *Canberra* in that category.

ble policy of acquiring manufacturing licenses for US or British combat airplanes to tide the industry over until it had gained the necessary know-how with which to produce effective, nationally-designed warplanes.

Instead, the industry's available energy was disseminated by an expensive and uncoordinated research program resulting in the appearance of a phenominal number of prototypes, few if any reaching production status. Millions of francs were squandered in building prototypes of a 100,000 pound military freighter intended for the transportation of 12-ton tanks. It was only after the first prototype had crashed—by which time a further six machines were nearing final assembly stage—that the contract was cancelled. It was pointed out that the French Army *did not possess any 12-ton tanks*, neither had any order for such tanks been placed!

Unstable internal politics resulted in a series of Air Ministers, each countermanding the orders of his predecessors. Subversive elements spread dissatisfaction among the airplane workers. It was not until a series of moderate governments slashed the fat subsidies and development contracts and the bewildered, and by that time apathetic industry was brought to the verge of financial collapse that it realized that prototype development alone could not guarantee the industry a continued existence. A process of retrenchment followed. Plants were closed down and personnel laid off while others switched their production lines to non-aviation products.

By 1949, it began to look as though the airplane industry was to be still further cut down. But the worsening international situation and the obvious necessity of building up the country's air defense awakened the French from their lethargy. This undoubtedly saved the greater part of the aircraft industry from final collapse.

A license was obtained to manufacture the British de Havilland *Vampire* fighter. A (*Continued on page* 47)

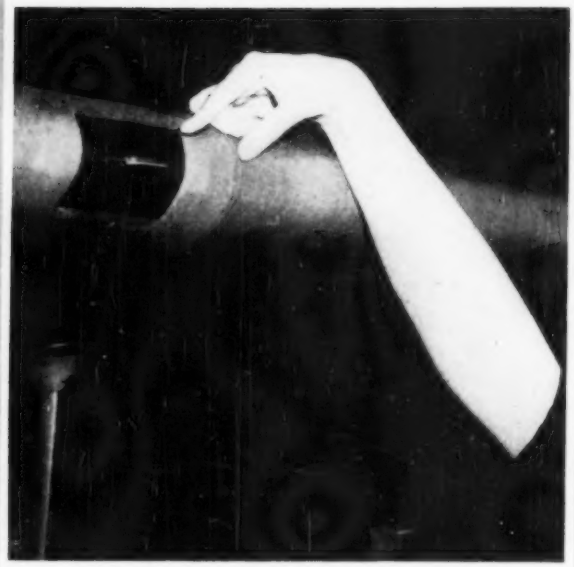
French answer to MiG-15 is Dassault *Mystere*. It has the *Ouragan* fuselage. Sharply swept wings and tail are like the F-86 Sabre.

One of three carrier-based planes being considered for production, Nord 2200 has a radar scanner in the nose and lateral air intakes.

SO 4000 twin-jet bomber is the best of the prototypes. Nene turbojets create a speed of 528 m.p.h. with loaded weight of 48,400 lbs.

Back-seat Pilot

By ED HOADLEY



Small aluminum vane on leading edge is the only protruding part of wing installation of Safe Flight's stall warning indicator.

The author settles the stall warning vs. seat-of-pants argument by proving a pilot needs both.

A PIPER *Clipper* attempted a take-off from my airport a couple of months ago. The pilot waived a suggestion that he use the long runway into the wind, preferring to use a short runway crosswind. He seemed to know his business so with four people aboard the *Clipper* rolled for 700 feet, tail down and broke ground. Instead of leveling off, the aircraft leap-frogged every 50 feet clear across the airport, struck a fence, and ricochetted some 20 feet into the air.

The horror-stricken observers began to run for the impending crash. No airplane could knock over a black locust fence post and woven-wire fence and still continue to fly. However, this airplane staggered along, imperceptibly gained altitude and disappeared to the North, some 50 feet above the ground. Warnings were issued to the State Police and all airports. Weeks later we learned that the pilot flew the aircraft almost all the way to Chicago and landed safely. This is a tribute to the stoutness of the *Clipper*—not to the pilot's ability.

In this case, I know that a stall warning device would have prevented the leap-frogging, the crash at the fence and the danger to the passengers. Even a rash pilot will heed the red light, and the "beep" of a stall indicator. The pilot was lucky but this accident could have had an entirely different ending.

A pilot with 500 hours tried to climb his amphibian at normal attitude after take-off. His stall warning indicator "beeped" and he dutifully lowered the nose. Later, the fellow found six inches of water in his number five hull compartment. If this pilot had not been warned, he would have found himself in a dangerous situation.

Everyone has probably been engaged in those arguments around the stove at the airport. The "hot pilots" advocate their Seat-of-the-Pants doctrines. Many old-timers scoff at any of this new-fangled stuff. I've heard it and I've said it many times:

"Fellow, if you can't fly by yer britches, yuh'd better stop flyin'!"

A good pilot needs nothing but an oil pressure gauge and buttocks reaction. The newer breed of pilots suggests in addition to these, an airspeed indicator and an altimeter. By way of rebuttal, you'll get arguments from old and new pilots that sometimes your pants can let you down. You won't get that sinking feeling in the seat of your pants that warns of a stall. The controversy rages with pilots about evenly divided on the subject.

My thinking on this subject started on the SOP (Seat-of-the-Pants) side, and since the war has veered in favor of the SWD (Stall Warning Devices) thesis. It is my belief that both are necessary to all who have soloed. Those who have soloed up to now, have been thoroughly indoctrinated in pre-stall and stall technique. It follows then that those in this category have instinctive SOP reactions. The warning devices should but be like a cautious wife—to backseat drive for you.

Those who have not soloed should be taught SOP reactions first and thoroughly, then let him in on the warning devices. Even when a student has soloed without ever getting the knack of sensing that "sinking feeling," he can learn to lower his nose when a pretty red light flicks on, and a raucous horn blows. But this same student will be in difficulty one day since all gadgets in an airplane eventually fail. We all know that airspeeds fail at times. Without the SWD and the SOP and the airspeed

reading, this student is going to be strictly out of luck.

There is nothing complicated about these contrivances as they exist today on the lightplane. Three items are necessary, one of which is your battery. The other two are a panel unit and a vane unit. The panel unit consists of a "beep" horn and a red light. The vane unit is nothing but an airstream-controlled on-and-off switch which electrifies the panel unit.

The vane is located on the wing panel leading edge, outboard from the currents of air created by the propeller. Vertically, it is located 60° below the chord-line. A small metal tab protrudes into the free air stream. This tab is held down by the air in normal flight. However, should the wing approach a stall, air pressure no longer holds the tab down. It pops up, closes an electrical circuit, and you have the "beep" and the red light. Aerodynamically, we know that there is a stagnation point on the leading edge where part of the air goes over the airfoil and part goes under. This moves as the angle of attack varies. On a NACA 23 airfoil, for instance, an abrupt stall occurs just a hair above a 20° angle of attack. On a typical lightplane, such as the Taylorcraft, this occurs around 40 m.p.h. indicated airspeed. The device is set to operate three to five miles per hour above the stall. If the aircraft approaches the stall, the pilot is adequately warned. It does not matter what the attitude of the plane is.

Here is the essence of the argument of the Anti-SWD's. The ones that I have talked to state that the device might work in normal landings and stalls, but it won't work in verticals, high speed stalls and abnormal attitudes. Besides the Seat-of-the-Pants technique will always warn them much better than any gadget.

The first thought is refuted by conclusive tests run by the CAA. They've checked SWD in every conceivable attitude, speed and loading consistent with flight. They have proved beyond any doubt that the gadget works. It works anytime your plane gets close to the stall whether it is on the final, slow, low ("so-long") turn before landing, or in that nasty high speed stall.

The SOP technique that we all brag about actually has been disproved by some of the old-timers themselves. The National Research Council took veteran instructors and experienced pilots on a series (*Continued on page 52*)

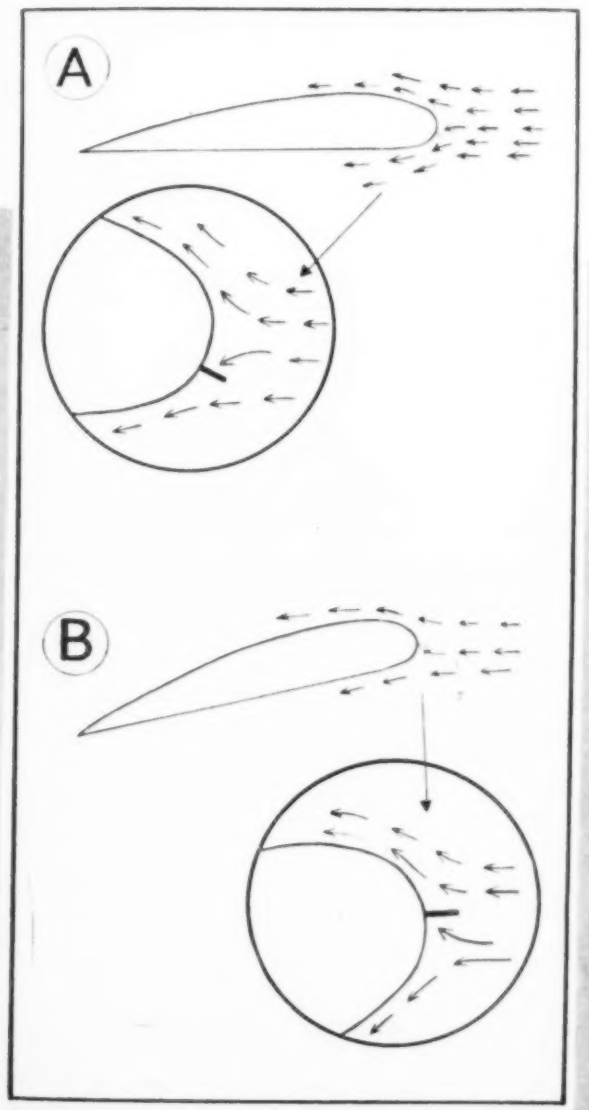
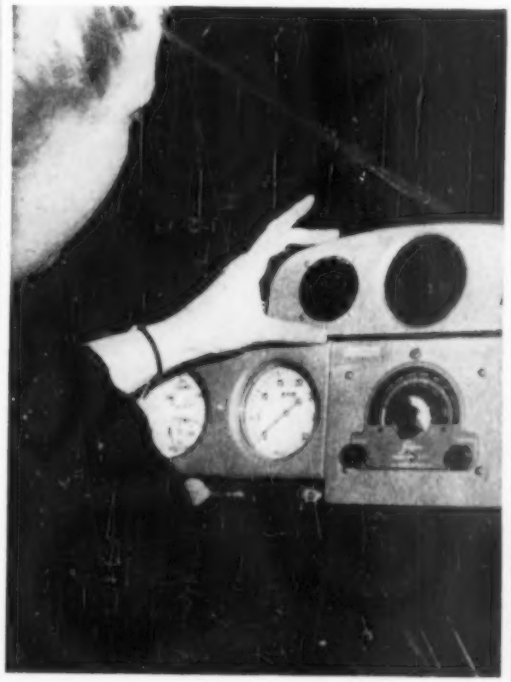


Diagram (left) indicates how air flow past leading edge of wing operates the vane. *A* is wing in normal flight. In the magnified section, see how air flow pushes vane down, keeping circuit to stall warning indicator open. *B* illustrates separation point of air passing above and below wing, which moves downward when airplane approaches stall. In the enlarged section air flow pushes vane upward as stall is neared. This action closes electric circuit and actuates device. Photo below shows how the stall warning indicator is mounted on Piper *Super Cruiser* instrument panel. Warning light is in the center.



MIKE TALK TECHNIQUE

No matter how distinctly he talks, if a pilot holds the microphone too far from his mouth, his message will be garbled.

Another "mike offense" is committed when pilot projects his voice straight ahead, yet has the mike at the side of his mouth.

The correct method of using the mike is to have it resting lightly against the upper lip and using a loud, concise voice.

By DAVID C. COOKE

Well-known aviation writer, the author was attached to the 8th Air Force as war correspondent. His aviation books include "War Wings", "War Planes of the Axis", and his latest, "Young America's Aviation Manual."

GRAMPAW PETTIBONE is Naval Aviation's mythical old man with the beard who knows everything there is to know about aviation, and he insists that one of the most important but usually neglected phases of flight training is communications.

"Aviation has a lot of new words of its own," Grampaw would say. "If you don't use these words properly and if you don't say them properly over the radio, you're going to run into a whale of a lot of trouble."

That is why, in addition to teaching new cadets how to fly, the Navy is now also teaching them how to talk. Every new flight cadet being trained by the Navy is given a thorough course in speech intelligibility at Whiting Field, Florida, before he is allowed to solo. This is to make sure that his instructions and requests for information over the radiotelephone will not sound like a lot of gibberish to the control-tower operators.

Not only Americans, but French, Italian and other Atlantic Pact Nations cadets receiving flight instruction under Navy tutelage are also given the course. But surprisingly, control-tower operators often have more trouble understanding natural-born Americans than they do the young and eager foreigners who are still struggling with the English language.

"Students coming from the South or West have a tendency to drawl or slur some of their words," say the tower operators, "and those from New England have too much of a twang and sometimes pronounce their *r's* like *ah's*."

These are some of the things that the speech intelligibility instructors at Whiting Field have to correct. If a cadet speaks too slowly they have to speed him up, if he speaks too rapidly they have to slow him down. Tests have proved that the best transmission speed is between 116 and 150 words per minute. If the speaker transmits slower than 116 w.p.m. he is apt to exaggerate pronunciation, and if he transmits faster than 150 w.p.m. the listener doesn't have enough time to absorb the meaning of all the words.

Students are warned that every sound, syllable, and

The Navy is teaching pilots with drawls, nasal twangs, Brooklynese and just plain bad speech how to speak clearly and distinctly.

Instructor listening in on NAVCAD student trainees as they practice the proper mike techniques in the radio telephone classroom.

word must be pronounced distinctly if messages are to be easily understood. There should be no distortion or over-pronunciation, and final word-sounds particularly should be stressed without adding extra sounds or syllables.

One of the most important points in the three-lesson, three-hour course is the correct usage of the carbon microphone now issued as standard equipment. Long experience has shown that pilots have a tendency to hold the mike too far away from their lips or too much to the side, or they speak too loud or too softly. One of these faults is bad enough, but in combination they make the listener's job really tough. Actually, the correct method of using the mike is to have it resting lightly against the upper lip, and speaking straight into it in a loud, concise voice.

So that key words in a message may be spelled out to avoid any possibility of confu- (*Continued on page* 53)

Air Controlman H. D. Byard giving individual instruction in the carbon mike to French NAVCADS (above) grouped around plane.

French, Italian and other Atlantic Pact Nations send cadets to the U.S. for flight training Navy-style and they, too, are given the course in speech intelligibility. French and American pilot trainees are shown here learning the proper mike talk techniques.

ADIZ

If private pilots respect the five-star plan for security, they will continue to fly.

By VERA FOSTER

FIVE new Air Defense Identification Zones have been designated to complete the U.S. defense perimeter and are now in effect. In addition to the ADIZ areas already in existence along the western and eastern seaboards, the new aerial wall has been erected along the Canadian border.

The Great Falls ADIZ takes in most of Montana; the Minneapolis ADIZ all of North Dakota, Minnesota and most of Iowa, as well as major parts of Nebraska and South Dakota. The Alaskan ADIZ covers Alaska and a large ocean area. The Travers City ADIZ claims a generous half of Wisconsin and Michigan.

Since a well monitored Canadian ADIZ protects the Lake Erie area, no U.S. zone was necessary there. Parts of New York State, Vermont, New Hampshire and Maine fall into the Bangor ADIZ, fifth and last of the new five star plan for security.

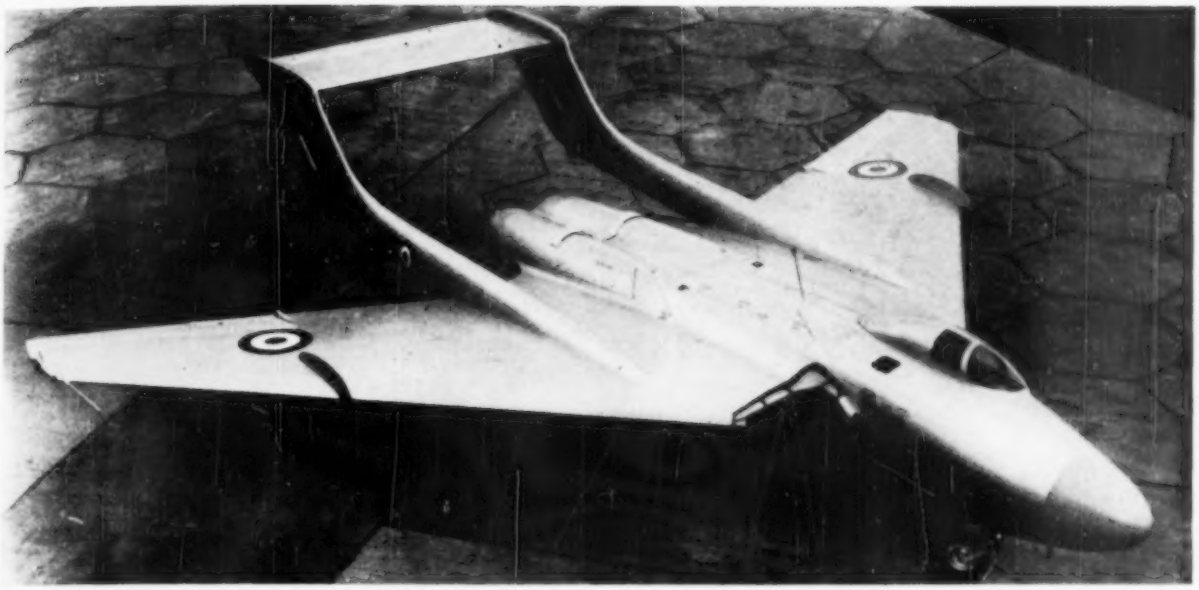
What's the deal when flying in these zones? Well, unless you plan to fly over 4,000 feet or cross a border into Canada, keep on flying as usual when under visual flight rules without a flight plan and radio equipment. Instrument flights also comply automatically with the requirements of ADIZ flying so there's no complication there.

However, when planning a flight of over 4,000 feet, VFR, a new type of flight plan, the Defense Visual Flight Rules (DVFR), is required of all pilots. This flight plan must include the estimated time, position and altitude at which the pilot will penetrate the ADIZ. It may include instead, if desired, the last reporting point prior to penetration of an ADIZ and estimated time over the next reporting point along the pilot's track.

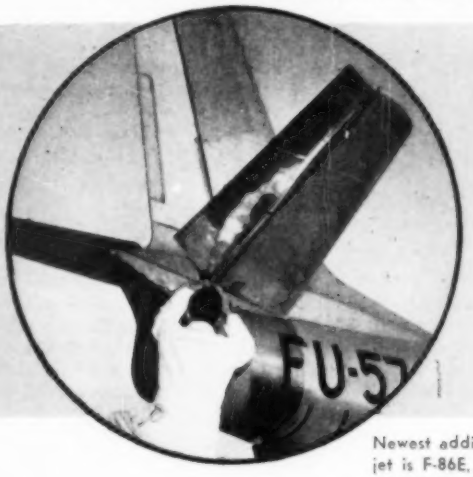
Instead of the careless ETA's and navigation that many of us allow ourselves, we'll have to maintain complete accuracy on DVFR flight plans. If an error is noted in estimated time of over 5 minutes or position over 20 miles off, a corrected flight plan has to be filed to avoid interception.

Don't traipse over to see Mabel either without letting CAA know about it. The rules say, in anything but a lighthearted manner, "The pilot shall not deviate from his DVFR flight plan unless he gives prior notification. Pilots are permitted to begin to let down when within 20 miles of their destination without reporting an altitude change.

When radio failure in flight occurs just proceed according to the last filed intention (*Continued on page 48*)



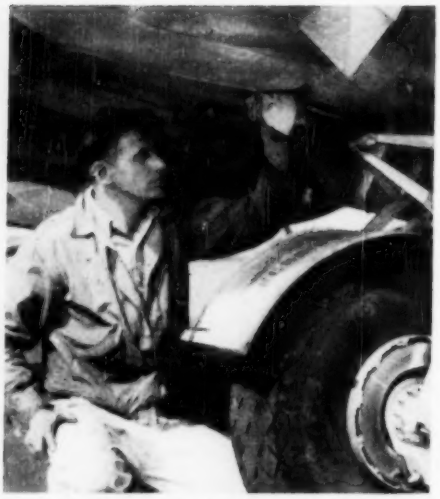
The de Havilland 110, first of new day-night fighter class, is fitted with two Rolls-Royce Avon jet engines. Built on twin-boom principle, it combines very high performance with modern electronic navigation and combat aids.



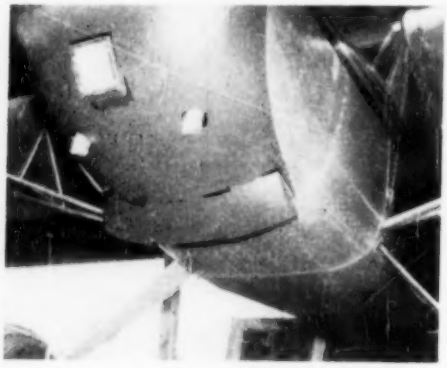
HAVE YOU SEEN?

Newest addition to the Air Force North American F-86 *Sabre* jet is F-86E, featuring an "all flying tail." Horizontal stabilizers are now linked with the elevators for coordinated movement.

The AU-1, new version of F4U Corsair, has been converted from a night fighter-bomber to a low altitude attack plane suitable for close ground support. Powerplant has been changed to a single stage version of the Corsair engine.

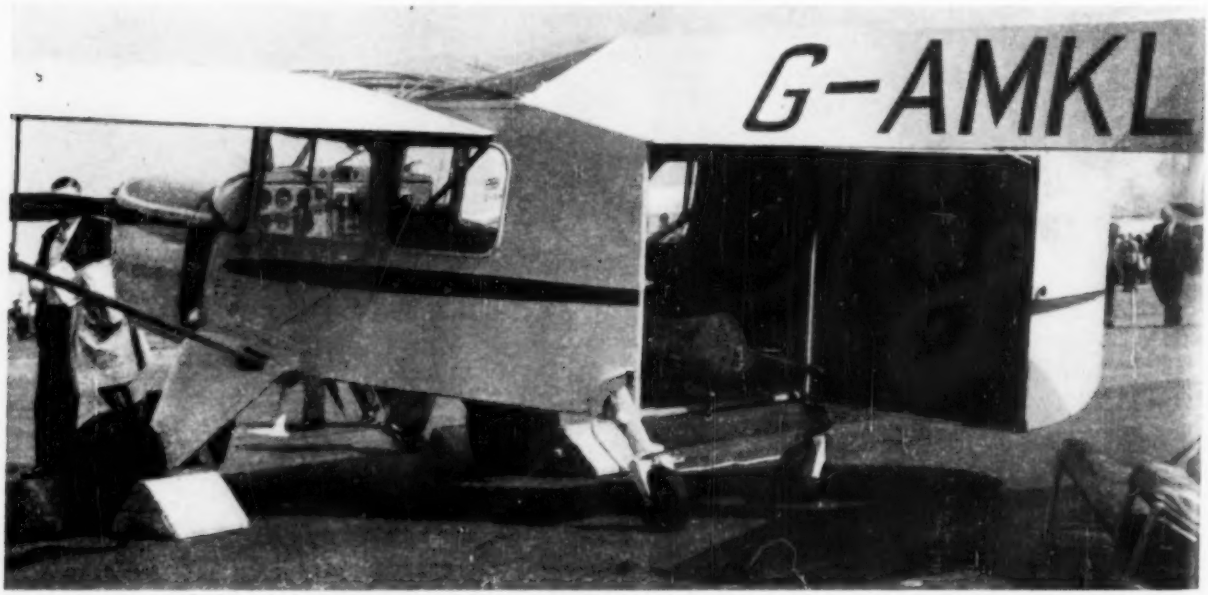


Invented by a pilot for his Beech, these drip pans keep the oil drippings off plane wheels.

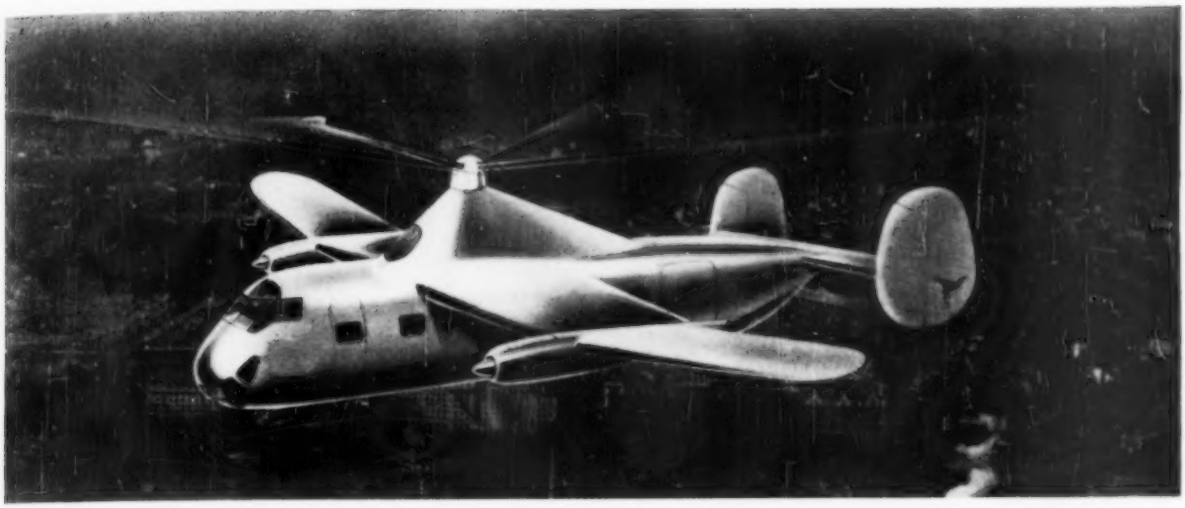


Servair has developed cowl flap for Cessna operation in areas of extreme cold weather. Manually controlled from cockpit, it can be closed completely during cruise and opened for take-off, climb and taxiing in heavy snows.

Latest addition to the field of fantastic weapons is this Buck Rogers-type one-man military midget helicopter. Developed for the Office of Naval Research by Rotor-Craft, it weighs less than 100 pounds. Liquid rocket motors in tips of rotor blades are reported to give the *Pinwheel* higher performance for the load it carries than any helicopter ever built. Further data has been restricted.



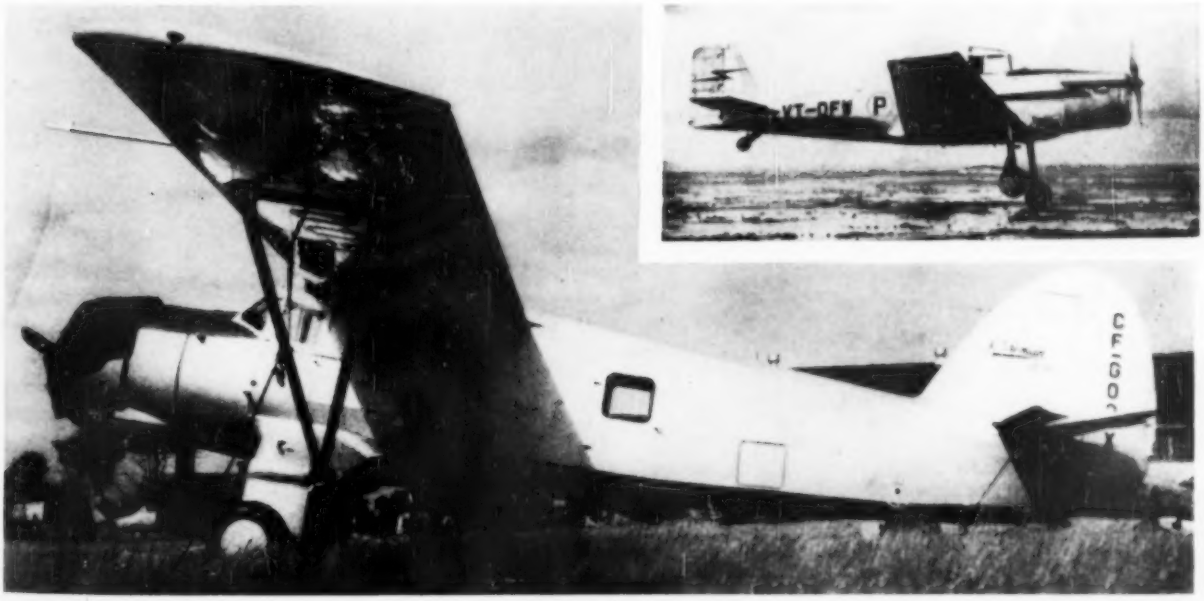
The door-way opening on the new Auster 4-B light transport is 3-feet wide. Cargo 13 feet long can be loaded easily. Powered by a Cirrus 180-hp. engine, it has a speed of 110 m.p.h. with a 300-mile range. In addition to freight, it can be used as ambulance.



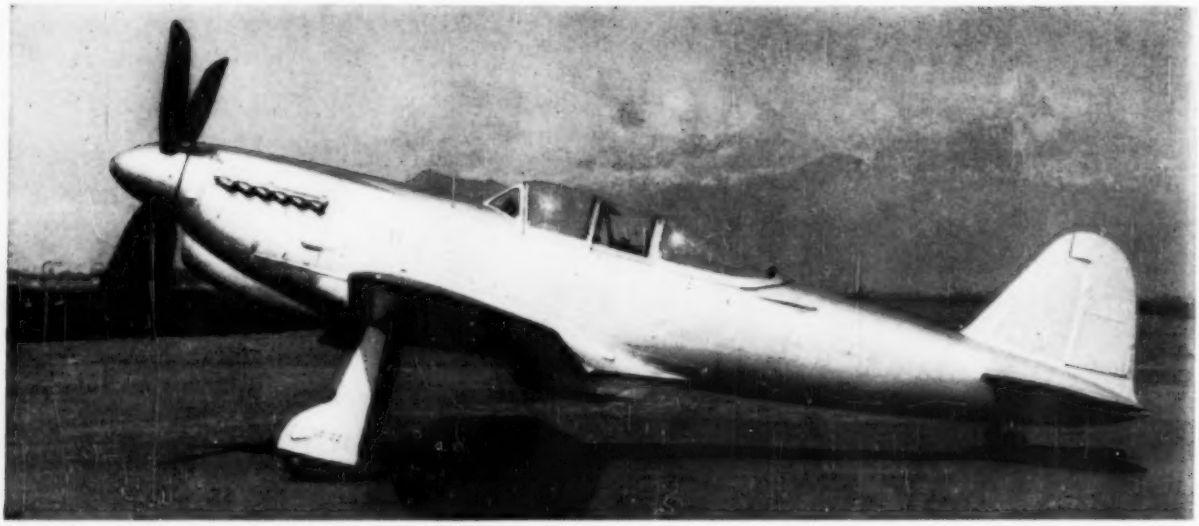
Fairey *Rotodyne*, under construction in Britain, is powered by 2 Armstrong Siddeley *Mamba* turboprops. Air is tapped from wing mounted turbines to rotor tips where separate reaction units can be used when needed. Carrying 23 passengers, it cruises at 135 m.p.h.

CallAir's new contribution to agricultural flying is their A-2 plane. Special innovation is the quickly removable droppable belly tank for spraying operations. Its low-wing, high-cockpit construction gives good visibility.

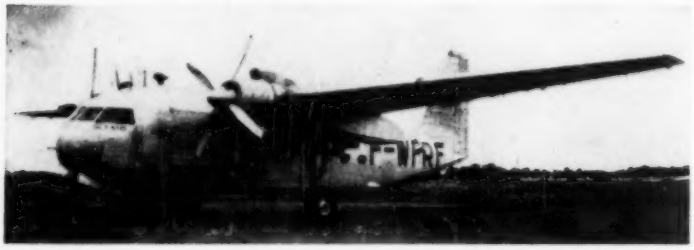
Turbulent air found at normal sky writing level of 10,000 to 15,000 feet has many times wreaked havoc with well-written words. To avoid this, Skywriting Corp. of America has outfitted Douglas SBD-5 as high-altitude skywriter to operate at from 20,000 to 25,000 feet. A C-54 fuel transfer pump was installed to pump the smoke liquid. Its 1¼-mile square letters are visible from 30 to 40 miles.



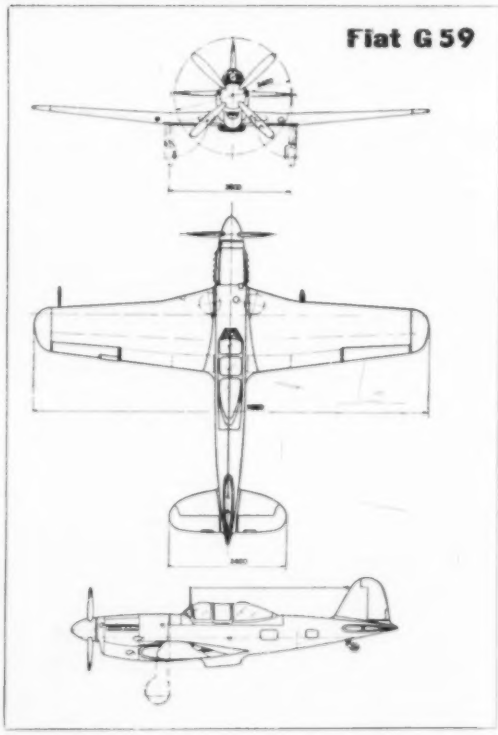
Modification of Canadian *Norseman* features metal wings and a longer nose, which results in more room for engine accessories. The H.T.2 Basic Trainer (inset) is India's first built prototype. Of all-metal construction, it is fully aerobatic. Top speed is 145 m.p.h.

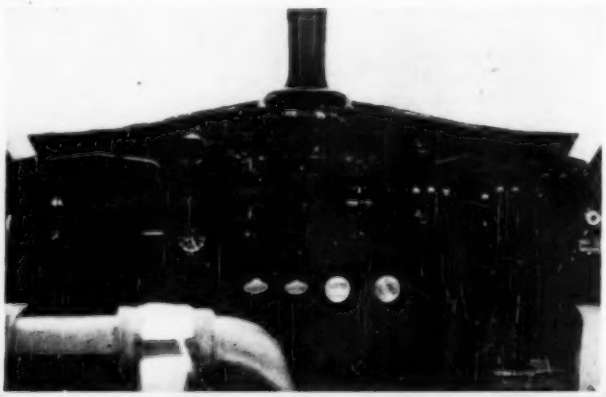


Especially suitable for the advanced training of pilots in high speed and altitude flying, Italian Fiat G.59-4 (above and three-view) has a top speed of 373 m.p.h. Its range is 610 miles and maximum ceiling is about 37,000 feet.



The Breguet *Mercure*, French 40-passenger freighter, is available with 2 types of engine. Two Bristol 2,000 hp. *Hercules* power the 890-H at a speed of 236 m.p.h. Four MA 500 hp. *Argus* engines create a speed of 218 m.p.h. on the 892-S.





Designed by Avions Max Holste, MH-152, all-metal monoplane, can be used for observation, ambulance, photograph, freight or five-passenger service. Complete instrument panel (inset) takes care of all contingencies. Salmson AS.804 engine creates 145 m.p.h.

"Parked on the ramp overnight, we had been a sitting duck for bleed passage icing."

Captain Sundberg, a first pilot in the Air Force, is stationed with the 757th AC&W Squadron in Blaine, Wash.

I Learned About Flying From That! NO. 144

By CAPT. KENNETH E. SUNDBERG as told to Capt. Hugh J. McLaurin

Near-fatal accident proves that checking the engines isn't enough for safe winter flying.

THE FIRST light snow of the season covered the ramp as my co-pilot and I walked out to the B-25 I'd been assigned to fly one morning in December 1949. This was in the days before the extensive "economy" campaign and we were scheduled to fly the Mitchell local out of Larson Air Force Base.

The weather was good for eastern Washington in December. The forecaster had advised me that the ceiling would hold at approximately 5,000 feet all day. The temperature was a brisk 14° as we strolled along the ramp at 8:15 a.m. There was no rush to make our scheduled 8:30 take-off.

The crew chief, an eager young sergeant, was waiting at the airplane. We quickly performed the routine outside inspection and climbed into the frosty cockpit. We soon had the big engines going merrily and were on our way down the long taxi strip to the runway.

The run-up was normal. The Mitchell checked out perfectly as I advanced the throttles to the stops in a power check. A few seconds later, at 0830, we lifted easily into the cold stable air after a very short run over the hard packed snow remaining on the runway.

After climbing out of the traffic pattern, we made a quick check of the weather for the benefit of the forecaster back at operations. We descended from the icy clouds, turned on the heater and went on a short tour of the area. Meanwhile the Ground Controlled Approach team got their "crystal ball" into operation, preparatory to directing me through the five GCA approaches I needed for my 1949 requirements.

I completed two uneventful low approach and landings. Accomplishing the subsequent take-off check, we moved into position and waited for clearance. Receiving the clearance, I checked the instrument hood for security and advanced the throttles for my third hooded take-off. With weight reduced by an hour's flight and two take-offs, the little bomber was airborne almost by the time I had the throttles full on. And then it happened!

With both throttles to the firewall and the gear coming up, the right engine backfired violently. I watched in dismay as the manifold pressure indicator began drifting slowly away from the take-off setting. The tachometer needle fluctuated wildly as the engine made several sporadic attempts to respond to our frantic efforts to revive it.

I flipped the instrument hood off. As the engine failed completely, I feathered the propeller and concentrated on gaining some altitude to clear the power lines which angled across the northeast end of the field. In a few seconds, which seemed like an eternity, we struggled up to a position level with the horizon where it rose abruptly in a bluff a few miles off the end of the runway. The altimeter indicated 300 feet off the ground as I turned carefully into the good engine now laboring mightily to hold that precious altitude and gain some badly needed airspeed.

With approximately 270° of the turn completed, I glanced out the side window to check the position of the runway. Just as I was about to congratulate myself on the landing I would make there in a few seconds, the left engine backfired noisily and quit abruptly! The runway, which such a short time ago had seemed so close, now might as well have been in the next county. At more than a mile from touchdown I hadn't (*Continued on page 59*)

Airports Are Where You Find Them

By HY SHERIDAN

THE way to tell if a story is true is simple," said a reporter for a Sweetwater paper. "If you can't believe it, it is. And if it is impossible, it happened in Texas."

Well, this night I was flying a Dizzy Six, or vice versa, from Mexico City to Chicago and as we got near Chicago we suddenly woke up to the fact that Airways Traffic Control had us by the ears. We had to hold Southwest of Joliet. The probable approach time was over an hour later.

"That's funny," I said.

"Ha, ha," laughed the first officer, "it sure is. Running low on gasoline always lays me."

"I wonder why we are holding," I wondered.

"I wonder, too," he wondered.

We flew around awhile, turning this way, and after a time we flew around that way. Then I said, "Maybe we are being held on account of the weather."

We flew around some more, and then I said, "I wonder what the weather is."

He thought that over awhile, and then he said, "I know what. We could ask."

So we asked and they said that the ceiling was 800 feet on account of an overcast and there was plenty of visibility, even more than you get with a television actress. That's good weather, you know, and we began to wonder what was holding up the parade. After we landed we found out. There were four lost planes, one of them an airliner of an outfit whose captains are famed for being able to find their way in the dark. Strange.. Strange.

Well, to make a long story, the first officer began tuning in a radio beam because the CAA has some sort of superstition that you ought to listen to their radio beams seeing as they went to all the trouble to put them in.

Well, the radio had gone completely haywire. No matter where we were we could get an on-course, an A, or an N. That beam station was sure versatile. We knew where we were because where we were holding the overcast was thin and it had a lot of breaks in it and I was as familiar with every detail of the terrain as a Hollywood masseur is with his. And then we noticed something else.

The wind blew. It was blowing from the West or Southwest—it didn't care—from 60 to 90 m.p.h. That didn't help any in dead reckoning navigation. We turned our omni set to the proper channel and the darn thing acted as excited as an old maid in a Marine barracks. It pointed all ways at once. And no matter how near to the station we got we couldn't get an identification signal. Why? Oh, static.

Well, we had left our ADFs and we tried them but they just went crazy, like a sky terrier in a fire plug factory.

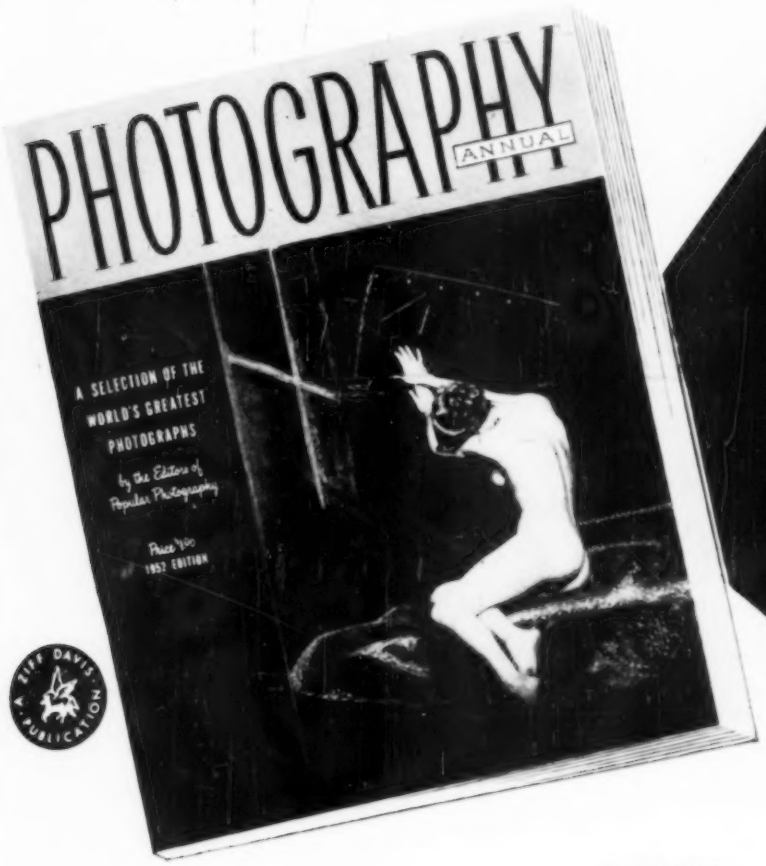
Why did the radio go so balmy? After the flight was over—I didn't get bumped off—I asked some radio and weather scientists how to account for such strange electrical and radio conditions but they had no ideas, which is not so strange, and no wild-eyed guesses, either, which is.

It remained for a high school boy to fish up a good explanation. He said, "Check up with the astronomers and see if we had a meteor shower that night. The static electricity caused by meteor friction in the upper atmosphere could disturb the ionosphere." I checked and it was a night when the schedule of heaven called for a meteor shower, all right. This concept is donated to the weather scientists as alms.

All the time we were sitting up there the CAA never told us what the conditions were as to the gale winds or as to the strangely misleading radio conditions or as to the fact that planes were missing approaches and getting lost, so that we could watch out. The airline company didn't either, but then the company never likes to scare us.

Well, it finally came our time to approach. As we came bucketing in, the localizer needle just waved goodbye to us. But we got in our first crack at it and our gaudy success was all based on the cunning generated by long experience, for your modest correspondent has been flying for going on 36 years. You may well wonder, nevertheless, why it was that I could go right in where several experts had missed, on their first approaches at any rate, and some of them had actually gotten lost for awhile. Well, I'll tell you the trade secret, I'll tell you how I did it. I just headed for the place where it was least likely that there could be an airport, and there she lay. END

BIGGER, EVEN BETTER THAN THE '51 EDITION!



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AIRCRAFT OWNERS AND PILOTS ASSOCIATION

AOPA NEWS

Aircraft Owners and Pilots Association is a service organization for the private pilot or aircraft owner. AOPA's full time staff is devoted to helping the individual pilot. Its aim is "To make flying more useful, less expensive, safer and more fun."

Headquarters address is Box 5960, Washington 14, D.C. Members also receive a special AOPA edition of FLYING, newsletters and confidential aviation data. Opinions expressed in this column are not necessarily those of FLYING Magazine.

MORE RESTRICTIONS?

There's a proposal afoot in Washington to officially designate "congested areas," to establish a new set of weather standards for those areas, then restrict flying in the areas under some relatively-high weather minimums.

AOPA is participating in meetings now on the subject, and is the sole representative of the non-airline civil pilot and plane owner. The plan is being pushed largely by airline interests, in an effort to eliminate some non-airline traffic from these areas.

The suggested congested areas would be around heavily-flown areas like New York, Chicago, Washington, Los Angeles, and others. The new weather specifications would include a new category: MVFR weather (marginal VFR). At present, the talking limits for MVFR weather are 1,000 feet and three miles to 2,500 feet and six.

At this writing, the meetings had not progressed to the point where AOPA felt able to take a positive stand—except to state that we oppose any further restrictions on flying until the need for them could be proved to AOPA's satisfaction. Members are being kept posted on developments in the AOPA Confidential Newsletter and AOPA PILOT.

NEW FORMS AVAILABLE

AOPA's Flight Service department has streamlined its foreign-flight procedures with the addition of new forms for expediting members' trips abroad. Two new AOPA forms, available free to members, cover the Government requirements that the proper Government officials be notified of a pilot's intent to take a temporary sojourn out of the United States; the other form is to help members comply with the requirement that pilots give U.S. officials advance notice of arrival at a U.S. airport from a point outside the country.

AOPA also is completing a standard manifest form, to be supplied members in quantity whenever they make a flight outside the U.S.

CHECK ON ACCIDENTS

AOPA recently participated in the analysis of the wreckage of a *Bonanza* which crashed a short distance off the end of the runway at Washington National Airport, killing an AOPA member and his two passengers.

Because of AOPA's concern over the accident, Civil Aeronautics Board investigators asked AOPA to help them study the *Bonanza's* wreckage after it was salvaged from the Potomac River by U. S. Navy salvage equipment.

The CAB report on the accident will be issued at some later date.

COOPERATING MEMBERS

At the request of the U.S. Air Force, AOPA has been sending quantities of aeronautical charts to members in Latin American countries, where those members have been flight checking all types of data found on those charts. Countries in which such AOPA checks are currently being made include Colombia, Panama and Guatemala.

In recent weeks corrected charts have been received at AOPA National Headquarters from Ross Weatherhead (AOPA 59956), Cali, Colombia; and John C. L. Adams (AOPA 2972), Ancon, C.Z. All such information is turned over to the Air Force's Aeronautic Chart and Information Service.

"ACTIVE" POPULAR

AOPA's new Active membership category is proving to be the choice of the majority of members renewing their present membership. More than 75% of all renewals are in the new category.

AOPA National Headquarters also announced a special family membership under the new Active category, designed for other qualified members of an Active member's family. The family membership is $5 and gives each such member his own set of credentials and an insurance policy. But all other features of the standard Active category go only to the original member in that family.

LOTS OF INSURANCE

AOPA members insured under the Minnesota Mutual-AOPA group life insurance program are now covered to the tune of about $10,000,000.

Meanwhile, AOPA National Headquarters currently is negotiating with the Minnesota company to reopen the insurance program (which closed on a pre-announced deadline date for applications) to those qualified members interested in signing up.

The group-life program—the first of its kind in aviation—makes available a $5,000 policy for a premium rate of $60 per year, a rate that compares favorably with non-aviation coverage of the same type.

STILL MORE RESTRICTIONS?

AOPA has taken a strong stand against another current Civil Aeronautics Board proposal—to put a 500-foot floor on all flying anywhere in the U.S., and to increase the visibility limitations for all flying. Both proposals have been made to cover the entire U.S. air space, whether it's within a control area or control zone or not.

In a sharp letter to CAB officials, AOPA points out that they obviously are trying to justify such new restrictions because of some commitments made at the Montreal meetings of ICAO (International Civil Aviation Organization). In its letter of protest, AOPA criticizes the CAB effort as being a thinly-disguised means of conforming to the international rules—despite the fact that, from a realistic point of view, the proposed rules would put a tremendous burden on American pilots and plane owners, while hardly affecting those of other countries at all. The AOPA letter points out that there is more civil flying in the United States than in all the other ICAO countries combined.

AOPA also charged CAB with not having any substantial factual data on which to base these new restrictions, and AOPA asks CAB to show AOPA officials whatever data they feel would justify such drastic action. AOPA also contends the present regulations are more than sufficient to take care of present violations of good-flying practices, and that no new laws are needed.

CROSSWIND LANDING GEAR

The accompanying photograph shows the first installation of the latest crosswind landing gear designed by John Geisse (AOPA 60752), formerly a research and development expert for CAA and largely

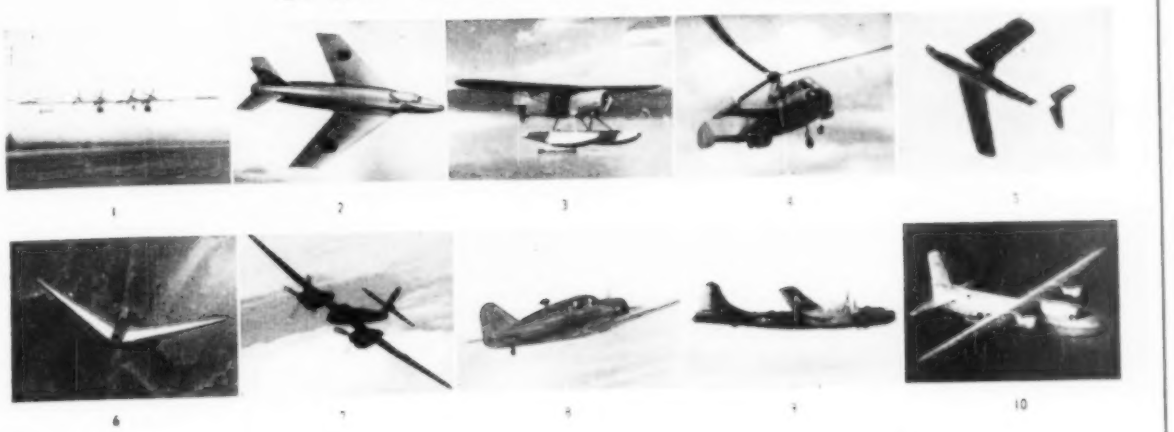
responsible for the origin of what now is the Goodyear crosswind gear.

Geisse's new gear is extremely simple, and the prototype, which is made of steel, only weighs 4½ pounds per wheel. Production models of the gear would be made of dural, which would reduce the weight per wheel to 2½ pounds.

The prototype gear is shown in the accompanying photograph on a Cessna 140 owned by the American Mercury Insurance Co., AOPA's insurers. Note that the wheels caster outward only. In the picture, the left wheel is castered its full 30°. Service tests of the gear now are being made by an Americo pilot and an AOPA staff member. Preliminary reports indicate the gear highly successful.

Meanwhile, CAA has just approved the gear on this particular airplane, removing it from the experimental category.

CAN YOU SPOT THEM?



The 340

(*Continued from page 27*)

new model. The extra area, together with a new wing flap system, gives the plane performance for feeder-line operations from smaller airports. The wing span is 105 feet 8 inches and area is 920 sq. ft., as opposed to the 240's dimensions of 91 feet 9 inches and 817 sq. ft., respectively.

The larger wing also accounts for the newly designed panels, outboard of engine nacelles, which makes it possible to step-up take-off gross weight 3,200 pounds, over the 41,790-pound gross of the 240. Also, the new version can carry about 2,000 pounds more payload than her predecessor and at higher cruising speeds.

Also credited to the new wing is faster climb to higher altitudes with a 150-gallon fuel capacity increase. Integral fuel tanks can now carry 1,700 gallons, compared with 1,550 gallons for the latest version of the 240.

Although the 9 foot 5 inch fuselage diameter on both models is the same, the length has now been increased 54 inches on the modification and it measures 79 feet 2 inches. Supplementing this, a 38-inch cylindrical fuselage section has been added aft of the wing and a 16-inch section forward. The space gained can either be used to increase passenger seating from 40 to 44 or for additional cargo loading.

The two 2,400 h.p. Pratt & Whitney CB series engines allow higher cruising powers. The CBs develop take-off power to much higher altitudes. At the same weight and power settings for maximum range condition the 340 cruises about 8 miles faster than its original.

The new transport is so designed that turboprop engines can be installed with a minimum of modification and expense as soon as gas turbines are available for large commercial operation.

Structurally, the 340 will be capable of flying at much higher speeds than will be possible in normal piston engine operation. Thus, airlines can be assured that their two engine transports will be flying for many years. When they can take full advantage of new gas turbine developments, it will mean no drastic changes on their initial investments.

Passengers and crew alike can anticipate maximum comfort. The performance of a new type engine-driven supercharger with two-speed operation calls for completely different and superior air conditioning equipment. A hydraulic clutch enables the air condition to function during ground operations since it automatically compensates for reduced engine speeds.

Cabin ventilating air is distributed through overhead diffusers which provide more effective cooling, heating and ventilation as each is needed. Flight deck ventilation hasn't been slighted either. An electric heater, installed in the duct leading to the deck, provides for the variations between cabin and flight deck temperatures.

The 340's new basic electrical system incorporates overvoltage and generator-feeder-fault protection. The control and power components will be separated into different units to simplify circuitry and to increase safety.

The central electrical compartment has been placed aft of the co-pilot's station to permit convenient servicing and easy maintenance for the majority of electrical units.

Approximately 600,000 hours operation flying time logged by airlines on 240s has resulted in a gradual development of a very highly successful hydraulic system. With a few minor changes and developments this same system has been woven into the 340 model.

The integral stairway on the 240 is operated by a combination of both hydraulic and mechanical power. The 340's steps are completely hydraulic.

Completely new also, is the landing gear. The main strut is considerably longer and low pressure tires, either in the 11.00-16 or 12.50-16 sizes, have been chosen to reduce pressures. Result is increased ground contact areas and longer tire life.

To insure the latter still further, both the strut and wheels have been designed for installation on a Decelostat unit and will prevent skidding. Tread of the main gear is 25 feet.

The 44-passenger Convair-Liner made its maiden flight on October 5. The prototype was in the air for a record two hours and the Consolidated Vultee engineers found everything to be "excellent in every way."

United Air Lines is slated to get the first planes off the production line as the first part of their 40 plane order. Delta, Braniff, Mid-Continent, Northeast, Hawaiian, Philippine and Continental are next on the production schedules. Several executive versions have been contracted for.

Convair's vice president J. V. Naish, on returning from a survey trip in Europe, commented, "The more than 100 high-speed Convair Liner 340s already ordered, plus additional ones on which we are now negotiating, will provide this country and Europe with a great increase in seat-miles available for meeting domestic transportation demands in the event of an emergency."

The day of the twin-engined plane is not over, as Convair is proving here and abroad.

There are more than 160 Convair-Liner 240s flying on all six continents. All indications are that the 340s will soon be way ahead and will be leading the field of multi-engine transports. END

THE MAIL BOX

SUGGESTIONS FOR CAA?

CAA radio could and should be set up in a manner far more useful to the private pilot. Here are some suggestions:

Towers should broadcast an identifying signal at all times. There is no necessity for the trouble that generally occurs in tuning in a tower.

The omni program should be accelerated. The VAR has no usefulness as it is a vastly inferior type of high frequency and those planes receiving it could also receive VOR.

The arguments favoring low frequency beams center around the fact that some planes are not equipped to receive high frequency. However the cost would be relatively slight to equip all low frequency radios with omni transmitters too.

Constant change of frequency should be stopped. The CAA should pick one or two stand-by high frequencies and stick to them so that a private pilot can know what stand-by frequencies a station has.

Omni stations should be on higher ground so their signal will carry farther. For reasons of economy I don't propose that present stations be moved, but I do suggest that new stations be placed higher.

These suggestions are not intended as a criticism of CAA. I have always met with intelligence, courtesy and helpfulness from CAA radio stations.

LINCOLN O'BRIEN

Santa Fe, New Mexico

MR. LIGHT SHEDS LIGHT

In the July issue of FLYING you printed a letter of mine in "The Mail Box" and in two following issues I was soundly bawled out by some of my fellow pilots. In as much as I took up flying again after a five year layoff, and got my license this summer, I found these comments rather embarrassing.

In the first place, my letter was merely meant to point out that what might seem to be a loss of power could just be a creeping throttle. Secondly, on the flight mentioned in my letter, my hand *was* on the throttle. However, it is absurd to think that one must grip this lever so tightly that vibrations could not work it loose. Once you realize you have "creeping throttle" you compensate for it automatically. A fleeting glance at the tachometer or an alert ear for a change in engine pitch never hurt anyone.

Lastly, it is absurd for anyone to think that I completed that infamous flight with my thumb deftly inserted in the throttle quadrant. About this I am sure no discussion is necessary.

I harbor no hard feelings towards any of my critics and surely none toward FLYING, which I have been reading for at least ten years.

LEONARD M. LIGHT

Cedarhurst, New York

● *We apologize sincerely to Mr. Light for any embarrassment caused him. But the misunderstanding did help us get across a very basic thought to novice and careless pilots. Sorry, and happy landings, Mr. Light.*—ED.

HANGAR LINE BOUQUETS

When a flyer receives especially good hangar line service, we feel that it is worth a bouquet and I would like to toss a couple.

At Milwaukee, Wisconsin, Anderson cleaned my windows both inside and out while I was having a bite to eat at Mitchell Field last night.

At Eau Claire, Wisconsin, Morey Airplane Company fixed my door lock and put new bolts in a seat hinge—"No charge, just part of our service." This new policy at Eau Claire may be welcome news to some of the boys who stopped there a few months ago and couldn't even get gas.

CHARLES W. BALDWIN

Clay, New York

● *A great deal of adverse criticism has often been leveled at airport operators. Since there are many more good bases than bad, FLYING is always happy to pass on the bouquets when thrown.*—ED.

WORD FROM CAPTAIN YOAKLEY

I am certainly pleased that my mountain busting exploit (Bail Out Over Korea, August, FLYING) should receive such attention.

However, I would like to add a major note to the article. There are two points to which I can truthfully say I owe my life. One, to the Lockheed Aircraft Corporation who built the F-80—one of the

finest air machines that has ever flown. Two, to the excellent technique of the helicopter's pilot, Lieut. D. L. Whittaker and his able crewman, ADI William H. Moore. Although a 30 to 35 knot wind was blowing, Lieutenant Whittaker hovered his machine perfectly over me, enabling me to grasp the lowered sling. When I was hoisted to the helicopter, ADI Moore reached out and grabbed me just as my strength was about gone from exhaustion, exposure and the freezing cold.

Had he not risked his own life in doing this, I would surely have loosened my grip and fallen some 100 feet back to the water. Due to my entanglement in shroud lines, life raft lanyard and heavy survival equipment, I was unable to put the sling around my body. Therefore, the strength in my hands and arms was all that held me to it.

The most pleasant part of the experience was the descent in the parachute over the harbor. It was like a supreme box seat to a great show as I watched the Navy guns slug it out with shore batteries.

In this parachute descent I thought about my wife many times on the way down. For some strange reason I was talking to her and telling her, "I will be seeing you again as I promised." To her I owe the most, for she gave me the will and courage to fight the entire ordeal to its successful end.

CAPT. W. R. YOAKLEY, JR.

San Francisco, California

● *We are delighted to have this additional material straight from Captain*

Yoakley to pass on to FLYING *readers. Thank you, Captain, and the best of luck to you from all of us.*—ED.

NAVY'S AIR ARM

It was with great pleasure that I read November issue of FLYING. As an Active Reserve Officer in the Navy Air Force, I was inspired to learn that a magazine with your circulation has finally shown that the Navy does have an air arm.

The American press has been concentrating on the Air Force and apparently forgetting that the Navy is still with us. The Air Force, however, is so busy trying out various new planes in combat that they never learn how to handle them. By the time they finish one type, up comes another.

Although the Navy's part in the Korean war has been minimized by the press, they will find upon investigation that the Navy has had a major share in it. Too many people feel that if we have enough Air Force bases, America is saved. They forget that someone has to bring supplies to those bases and that the supplies must be protected at all costs.

I hope that in some way this brings the work of the Navy's air arm to a segment of the American public.

BERTRAM STEINBERG

Brooklyn, New York

FLYING IN JAPAN

I have been reading the August 1951 issue of FLYING with great pleasure and find the most interesting article one entitled, "Eight Miles High—Without an Engine."

I was a student of Waseda University in Tokyo from 1937 until 1942 and trained in the soaring lightplane as a member of the Japan Student Aircraft Union. In October 1942, I enlisted in the Army Air Force as the pilot of a light bomber and sometimes flew reconnaissance planes on carriers. Between my vacations, I enjoyed soaring flights at Kirigamine Heights or Mt. Ikoma, the most famous place for gliders in our country.

Unfortunately, we lost our wings like a rooster by the self-killed war and now, although we cannot fly, we did not lose our admiration and affection for it. However, now that the peace treaty is finished, we are hoping that we can start again in the near future. During war time unfortunately, our Student Aircraft Union was conducted by the Military. But in the future we must absolutely exclude the Military and develop civil flying again.

My friends who were members of the Japan Student Aircraft Union have recently gotten together to exchange information and photographs obtained both from our school life and from various magazines. We will continue to meet every month and will be very happy to keep posted on the latest information concerning civil aircraft.

TANDANORI OHOKA

Minatoku, Tokyo, Japan

NEVER TOO OLD

Many people are still under the misapprehension that flying is strictly a young man's game. Of course, this is true as far as military and most commercial flying is concerned, but it definitely is not true for the person who would like to fly for his own pleasure or business.

I went to an air show in 1946 and after seeing what those boys did without an accident, I decided I could learn to fly safely. On my next trip to town, I headed for the airport and told the flight instructor that if he could teach me to fly, I'd buy a plane from him. I also told him that, if after giving me a few lessons, he felt I was too old to fly, I'd pay for the lessons and forget about flying. The result? I bought a plane in October, 1946, soloed two months later, and got my private license in May, 1947. I was 63 years old.

I live on a farm 40 miles from town, have some good landing strips and a hangar. To date, I have 281 hours and seem to get along as well as the young fellows although I don't do the stunts some of them do.

For the promotion of aviation, I have given free rides to 83 persons, and have my wife and some of my neighbors doing a pretty good job of flying.

Last August my wife and I flew to the Flying Farmers convention, met a lot of wonderful folks and had a dandy time.

J. M. ISENBERGER

Gillette, Wyo.

CASE FOR AIR SHOWS

From time to time articles have appeared in various aviation publications opposing air shows from the standpoint that they are hazardous as well as detrimental to commercial flying. As one who is vitally interested in commercial aviation and private flying, I believe air shows are being indiscriminated against without much thought or reason.

The subject of much discussion . . . has been a photograph, which appeared in newspapers throughout the country, of a Stearman stunt ship and an Army B-29 taken at the Oakland air show last fall.

This was an outstanding picture, but properly captioned would have been of no value from a news standpoint. In place of passing each other at a distance of five feet as publicized, the planes were at a distance of 500 feet, which according to CAA regulations is a legal passing distance. It is an accepted fact that depth perception is not apparent in a photograph, and by comparing the size of the stunt ship with that of the B-29, it is plain to see that they are a good many hundred feet apart. If they had been anywhere near each other, the size of the Stearman would be approximately the same as the distance between two of the engines on the B-29.

Comparing air shows with commercial flying is just about as logical as comparing the Indianapolis Speedway Race with everyday automobile driving. Or like attending a swimming meet and after witnessing all types of acrobatic diving have someone state that they would never swim again because they saw some hair-raising stunts off the diving board. Even if someone is injured while diving, the public has common sense enough to see that there is no connection between these exhibitions and ordinary swimming . . .

All shows in which I have participated have been insured by Lloyds of London, a firm that deals strictly with facts. If they anticipated any danger of loss whatsoever, an application for insurance would never be considered. In nine years of air show work, we have never had a crash, not even a minor one, and we've never injured a spectator nor a participant in the show. Nine years with a record of this kind should prove conclusively that professional air shows are not haphazard, reckless events—dangerous both to participants and spectators—but are carefully, well-planned demonstrations.

W. C. MCINTYRE, President

McIntyre Engineering Company

San Francisco, Calif.

AMERICAN CONTENDER

In response to your invitation to claim the title of champion plane spotter, I would like to say that I can recognize over 3,000 military, civil and all foreign aircraft from pictures. Or I can draw pictures upon hearing the names. Just to be sure I checked myself on 424 American civil aircraft.

ROBERT P. STRANT

New Rochelle, N. Y.

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Medium Bombers

(Continued from page 11)

bombing plan, in coordination with operations from such overseas bases as there were, as the best hope if the United States became involved in war with Russia. Then the mediums were given, and will continue to have, a squadron of tankers for each combat group.

Now, with a system of alliances established, negotiation for bases has become what looks like America's greatest real estate venture. Should war with Russia start, if the Korean experience is a guide, medium bomber groups now based in the United States could move out to advance bases and get over their targets in six to eight days.

Wherever the Russian looks today he is likely to find an air base that would come alive and begin to deliver punishing blows should he start a war.

The alliances which help to provide the legal framework for the base system include the North Atlantic Pact of 1949 to which Turkey and Greece are now admitted and the Japanese peace treaty signed this year at San Francisco which provides for retention of U.S. forces in Japan. Other defensive alliances include the Philippine pact of 1951 and the South Pacific pact of 1951 among the United States, Australia and New Zealand. As this was written a Middle Eastern pact was south as a final link.

Air bases thus are arrayed around the Russian perimeter in something like concentric circles, magnifying to an incalculable degree the blow that medium bombers and other planes can swing on the one hand and reducing the probability that all advance bases could be eliminated by the enemy on the other hand.

Within continental Europe there are at least seven American air bases in Germany and slowly rising numbers in France for joint use of NATO air forces. Bases are expected in Spain and they will be backed by those in the Azores. In England there were 11 bomber bases at last count and the number was increasing. The south shore of the Mediterranean and the flat coastal plain of French Morocco along the Atlantic Ocean will have mile after mile of landing area ready for use if a war starts. In advance of these latter bases are others on Mediterranean islands and in the Middle East. In Turkey are a ring of bases, one of them within 1,200 miles of Moscow.

Other links in the chain are in Alaska, Greenland and Iceland (sitting athwart the polar approaches), and in the Far East.

The military meaning of this base system was outlined for a Congressional committee by General Vandenberg:

"Obviously the closer you get to the enemy, the less gasoline you have to carry and the more bombs you can carry. Obviously if you have to refuel two or three times in the air you get two or three missions per month out of your airplane instead of 15 or 20. Therefore your Air Force, in order to do that efficiently, would have to be five or six times the size it would be if we had bases that were more nearly appropriate. Additionally it would take longer to have the full impact of the air war upon whoever we fought."

"Therefore," Gen. Vandenberg said in reply to a question as to whether European bases were essential, "they are not absolutely essential but they certainly are highly desirable."

What this means politically, Mr. Finletter attempted to explain in an Armed Forces television show: Medium bombers "don't go from the United States to the target and back. They require intermediate bases and those bases are in the main with our North Atlantic Pact." He said America must play ball with the North Atlantic allies. "They are a part of the free world with us and they are an integral part of our military planning."

Further light was shed by high-level military studies in which it was estimated several months ago, according to well founded reports, that SAC would need 60 to 90 days to complete its mission. The SAC mission has been defined by Gen. Curtis E. LeMay, Commander, as "the progressive destruction and disintegration of an enemy's war-making capacity to a degree where he no longer retains the means or will to wage war."

As SAC carried out its mission, much would depend of course on the ability of Atlantic Pact armies and tactical air forces to hold allied bases and prevent seizure of vital productive areas in Western Europe. The military estimate of the time it would take SAC to perform its mission was based on targets to be demolished, the atomic bomb stockpile, available planes, the bases network and the state of Russia's defenses—all variable factors. As the bomb, bomber and bases combination grows, the time conceivably is cut down.

The overseas bases system is not without its disadvantages. There is the tremendous expense of setting it up, now a multi-billion dollar proposition that would have been impossible before the Korean war broke out. There are the problems of base security in other countries and of avoiding friction with citizens of those countries. Long supply lines are involved. In many instances, caretaking establishments suffice and the combat group moves in only in the event of war.

SAC meanwhile holds onto and develops the muscle of its intercontinental groups. But enough has been shown, perhaps, to indicate how important overseas friends are to maximum efficiency in using the great bulk of SAC weapons carriers.

These carriers assume increasing importance as the atomic revolution widens and public speculation about new weapons grows.

We hear much, for example, about fantastic new weapons—so much, in fact, that the new Secretary of Defense, Robert A. Lovett, felt it necessary at his first news conference to put matters in perspective and assert:

"Aircraft now and for some time to come will represent the most efficient method of delivery and it is for that reason that the Department of Defense has indicated a need for appropriate increase in our national air power and its supporting factors."

The value of the Medium bomber, as we have come to know it, is enhanced, not diluted, as new missions develop, the battlefield retardation concept being a prime example. If a single B-29, using proximity fused bombs at night, has accounted for several hundred Chinese casualties, what would be the effect of a single B-47 using an atomic bomb wherever an enemy force was gathered in mass?

So planning and training go on, at Omaha, Wichita and a host of other bases, and we have the word of Maj. Gen. Samuel E. Anderson, 8th Air Force commander at Forth Worth, speaking for all SAC groups, that "joint studies have been made to assess the probability of success. As a result of these studies, I have no hesitation in stating that the strategic air offensive will not be stopped by the enemy. In the event of war, bombs are going down on target." END

☆ FLAT SPINS ☆

Friedrichshafen, Germany, once the home of some of the world's biggest Zeppelins and seaplanes, issued a formal complaint to the Western powers: Allied planes make too much noise.

It sure enough looks like the air age is here to stay. The CAB granted permission for a helicopter-taxi service. The 'copter shuttle will operate between the Los Angeles International airport and neighboring towns like Pasadena, Riverside and Santa Ana.

In Springfield, Mass., an Air Force man asked Assistant Postmaster Michael Brosnan to cash a money order for a substantial sum. He offered his Air Force papers for identification and when asked for additional proof said "Okay, check the serial number on my papers and get a pocket mirror." The number was etched on his teeth.

For a while LaGuardia Airport officials didn't know what to do about a litter of seven pooches born in a kennel to a mother just arrived from across the Atlantic. It was finally decided they were proper U.S. citizens, born on U.S. soil and duty on the pups was waived.

In Burbank, Calif., a Lockheed test pilot's marriage went into a spin when his wife asked for a divorce on the grounds that he let their 11 year old son fly airplanes. She said she found it hard to raise their son properly with such goings-on.

One of the real sure enough pioneers of aviation was removed from the scene with the recent death of Benjamin Franklin Mahoney, 50, at Studio City, Calif. Mr. Mahoney built the plane that carried Charles Lindbergh across the Atlantic.

There didn't seem anything to do but just look. When Frank Cox, Leicester, Eng., swung the propeller of his training ship the craft took off without him. It had a nice, social flight for a couple of hours, then crashed in a pasture.

—Harold Helfer.

France's Combat Planes

(Continued from page 29)

contract was awarded to the large S.N.C.A. du Sud-Est plant at Marignane for the production of 224 of these planes. Marcel Dassault, the "strong man of the industry," received a contract for the production of 295 of his MD 315 *Flamant* light transports. In addition, various training aircraft were ordered.

Despite this step forward, military contracts were still insufficient to meet the gravity of the situation and to keep the French airplane industry's production lines moving. However, where exhortations had failed to bring about realization of the need for a concerted air rearmament program, the Korean conflict succeeded in driving the lesson home. The Secretary of State for Air, Andre Maroselli, suggested a Five-Year Air Rearmament Plan, designed to augment the inadequate orders placed earlier. The plan was approved in July 1950. Nevertheless, the greater part of the production orders called for by the plan were not placed with the manufacturers until the spring of the year.

The plan called for a second contract for 210 *Vampires*. An initial order for 150 of the promising Dassault MD 450 *Ouragan* fighter was followed by another contract calling for 600 more. An order for 160 Nord 2501 *Noratlas* medium transports and various trainer contracts were also placed. So with a few basic types standardized, the French airplane industry began to look to the future with confidence for the first time since 1946. Quantity deliveries of French fighters are now expected early in 1952.

The delivery tempo of license-built *Vampires* is being speeded up at Marignane and a more peppy, re-hashed version of the basic design will shortly be on the assembly lines.

Known as the *Mistral*, this new version of the *Vampire* has replaced the normal 3,500 pound thrust Goblin turbojet with a 5,070 pound thrust French-built Rolls-Royce Nene. The engine change has called for some redesign of the wing root air intakes, but the increased thrust has given the machine an appreciably more lively performance. Sea level top speed is now 578 m.p.h. as compared to the *Vampire's* 528 m.p.h. Climb rate is also improved, the *Mistral* reaching 32,808 feet in seven minutes 38 seconds, whereas the *Vampire* only reaches 21,325 feet in that time. The *Mistral* has retained the standard armament of four 20-mm cannon. An ejector seat designed by the S.N.C.A. du Sud-Est is a standard item of equipment.

Towards the end of 1952, the de Havilland *Venom* will replace the *Mistral* and *Vampire* on the Marignane assembly lines. The *Venom* is to be built for both the *Armée de l'Air* and French Naval combat elements, the former having ordered the *Venom* F.B.1 single-seater, and the latter the radar-equipped two-seat *Venom* N.F.20. A total of 270 jet fighters are planned for Naval squadrons under the Five Year Program. Apart from the shipboard version of the *Venom*, the only other contenders for orders are the *Nord* 2200 and the *Arsenal* VG 90, both of which crashed when first tested two years ago.

The NORD 2200 has been completely rebuilt and now features a radar scanner in the nose and lateral air intakes. The thin laminar flow wing has a 24° sweepback, high-lift Fowler extension flaps and leading edge slots which keep landing speed down and giving good control during deck approach. Estimated maximum speed is 593 m.p.h., initial rate of climb is 4,724 feet per minute, and endurance is one and a half hours. Loaded weight is 17,378 pounds which gives a wing loading of 51.17 pounds per square foot.

Although the *Arsenal* VG-90 was completely destroyed during its initial test phase, a second prototype is now complete and tests have been resumed. An unusual feature is its 25° swept wing mounted in shoulder position. The plane carries nose radar and three 30-mm cannon. Like the *Nord* 2200, power is provided by a French-built Nene turbojet, fed via lateral intakes. Maximum speed is 562 m.p.h. at 9,750 feet, and the VG-90 cruises at 375 m.p.h. Endurance is two hours.

The Dassault MD 450 *Ouragan* (Hurricane), which has been under test since February 1949, also will enter service next year. Thorough service evaluation has been carried out with a test batch of hand-built airplanes. Tooling up for quantity production is now complete at the Saint Nazaire and Bouguenais plants of the S.N.C.A. du Sud-Ouest and a production rate of 40 *Ouragans* per month will be attained by the summer of 1952.

The *Ouragan*, too, is powered by a Nene turbojet and it has a top speed of 612 m.p.h. The initial rate of climb is 7,800 ft. per min. and it has a duration of one hour and ten minutes. Continued development of this plane has resulted in the MD 453 *Mystère*. Using the *Ouragan* fuselage, it is comparable to the F-86 *Sabre* because of the sharply swept wing and tail surfaces. It is looked upon by the French as their answer to the MiG-15. Initially powered by a Nene, it attains an approximate maximum speed of 643 m.p.h. However, the production version of the *Mystère* will be powered either by the French-built Rolls-Royce Tay which is similar to the Pratt & Whitney J-48, or by the nationally-designed ATAR-101B axial-flow unit. Both engines give around 6,500 pounds thrust and speeds of 687-695 m.p.h. are anticipated with either of these engines. Radar-equipped single and two-seat versions of the *Mystère* are known as the *Aladin* and *Harmattan* respectively.

Tests with France's first postwar jet fighter, the S.N.C.A. du Sud-Ouest's *Espadon*, are still being carried out. Various modifications of the original design are flying. This lethal-looking machine, with its tiny raked wings and frightening wing loading, has not evoked much enthusiasm on the part of the Armée de l'Air. At a recent demonstration, however, it was seen that its powered ailerons allowed some very rapid rolls despite the machine's ungainly appearance. Also, the landing was not as "hot" as had been expected.

In its original form, the SO 6020 featured an untidy ventral air intake. It was replaced by lateral intakes on the second prototype, the SO 6020-2. A generally cleaned-up version, the SO 6021 is now flying and recently attained Mach 0.94 in level flight. Despite the changes, the intakes still appear to be giving trouble. Two versions featuring rocket boost for climb at combat, the SO 6025 and SO 6025, recently began flight tests. Already having lasted three years, the more protracted the development period becomes, the less likelihood is there of the *Espadon* gracing a production line.

Various development contracts have been placed for supersonic fighters. Engineer Leduc is testing three examples of the O.10 ramjet—powered research airplane. He also is working on a ramjet-powered supersonic fighter. A supersonic research airplane, the Arsenal 2301, is under construction at Chatillon-sous-Bagneux, and the S.N.C.A. du Sud-Ouest plant at Courbevoie is building the SO 9000 supersonic interceptor.

The SE 2410 *Grognard*, which flew for the first time in April last year, is in the heavy attack and all-weather category and could perhaps be compared with the B-57A *Canberra*. Two Nene turbojets are installed one above the other in the fuselage center section. The first *Grognard* had 32° wing sweep. The second prototype had a lengthened nose to house a second seat and reduced wing sweep. The third prototype, the SE 2420 *Grognard* III, is an all-weather and night fighter fitted with radar. There is little likelihood of its quantity production, however, as the S.N.C.A. du Sud-Est plants are likely to produce the *Canberra*, ...ch is so similar, under license. The *Grognard* has an all-up weight of 36,116 pounds and a maximum speed of 596 m.p.h.

The best engineered of France's jet prototypes is perhaps the SO 4050 twin-jet bomber, which flew initially in March of this year. The SO 4000 is powered by

• A FLYING TIP •

ONE of the problems of winter flying is how to take off from a snow-bound airport where no clearing machinery is available.

Walter Oakes found the solution. He was to take off from Rockford, Ill., for Chicago. The airport was covered with 30 inches of snow after a local storm. There were no facilities for cleaning the runway.

In order to get off, Pilot Oakes improvised skids by using pine boards measuring 1 in. x 6 in. x 24 in. He found that the skids fell away immediately after the plane was airborne.

Airport operators or pilots might do well to keep sets of such toboggans handy during the snowtime months.

—*Paul Harvey*

Got any tips you'd like to pass on to other pilots? Contributions should be typewritten, not over 200 words, and accompanied by a stamped-self-addressed envelope. Payment for acceptable material will be made at regular rates. Address "Tips" Editor, FLYING, 366 Madison Ave., New York 17, N. Y.

two Nene turbojets installed in the rear fuselage and features 31° of sweep on its low-aspect ratio wings which span only 58 feet 4 inches. The bomber has an approximate loaded weight of 48,400 pounds and a maximum speed of some 528 m.p.h. at 29,528 feet. But, the SO 4000 is another plane which cuts across the *Canberra's* duties and will no doubt, like the *Grognards*, be utilized as an engine testbed.

The Breguet 96 *Vultur* anti-submarine airplane is an extremely promising prototype under development for the French Navy. Armstrong Siddeley Mamba turboprop engine in the nose creates a cruising speed of 248 m.p.h. A Nene turbojet in the rear fuselage boosts the speed up to 560 m.p.h. for combat. The *Vultur* is a two-seater shipboard airplane with a cruising duration of four and a half hours. With a fuselage bomb bay capable of accommodating naval torpedoes, all-up weight is 22,204 pounds. A modification of this basic design is also under construction. It is the Breguet 961 single-seat ground attack airplane in which it is proposed to install the nationally-designed ATAR 101B axial-flow jet.

Comparative tests between the Breguet 89 *Fulgur* and the Nord 2501 *Noratlas* resulted in the choice of the latter as the future standard medium transport of the Armée de l'Air, replacing the vintage Junkers Ju 52/3m trimotors being used at present. One hundred and sixty are at present on order and deliveries will commence in the fall of 1952. Rumors suggest that the type is under consideration for license production in Britain for RAF Transport Command.

The design is strongly reminiscent of the Fairchild *Packet* since it has twin booms and a central fuselage nacelle with clam-type doors at the rear. The *Noratlas* is powered by two 2,040 h.p. Bristol Hercules radials, which are shortly to be built under license in France. With a top speed of 274 m.p.h., and a crusing speed of 208 m.p.h., the *Noratlas* has a range of 932 miles with 11,684 pounds of freight.

In the light transport category, the Armée de l'Air has standardized on the Dassault MD 315 *Flamant*. A number of squadrons already have taken delivery of their equipment. The *Flamant* has a top speed of 236 m.p.h., cruises at 186 m.p.h., and has a range of 755 miles. Two 580 h.p. SNECMA 12S engines are used. The French Navy has 25 Nord 1402 *Noroit* heavy amphibians on order and a further contract for an additional 20 machines will be placed shortly. Under construction at the S.N.C.A. du Nord's Le Havre plant, the *Noroit* is powered by two Arsenal 12 H-00 engines of 2,070 h.p. each and carries very comprehensive radar. Used primarily for coastal reconnaissance and air-sea rescue duties, the amphibian has an all-up weight of 45,947 pounds, a range of 2,144 miles and a maximum speed of 230 m.p.h.

The Armée de l'Air's standard basic trainer is the SIPA S 111-112 series derived from the Arado Ar 396. Various versions of this machine are in service, including the S.10, S.11 and S.12, which differ only in minor details. To date, the S.I.P.A. concern has delivered approximately 135 of these trainers, a further series of 52 is nearing completion and an order for a further 100 has just been placed. Fully aerobatic, the S.I.P.A S.111 and 112 are powered by a 495 h.p. SNECMA engine and have a maximum speed of 225 m.p.h.

The French airplane industry today consists of four nationalized companies, the *S.N.C.A. du Sud-Est* with plants at Marignane, and La Courneuve, and a personnel of 7,000; the *S.N.C.A. du Sud-Ouest*, with plants at Courbevoie, St. Nazaire, Nantes, Chateauroux and Rochefort, with a personnel of 5,200; the *S.N.C.A. du Nord* with plants at Le Havre, Les Mureaux, Sartrouville, Bourges and Meaulte with a personnel of 5,400, and the engine concern *S.N.E.C.M.A.* with plants at Paris, Billancourt, Gennevilliers and Suresne, and a personnel of 7,000.

Non-nationalized sections of the industry include Avions Marcel Dassault with plants at Melun-Villaroche, Talence, St. Cloud and Boulogne, Société Hispano Suiza whose plant at Bois Colombes employs 4,200; Société Louis Breguet, with plants at Villacoublay, Toulouse and Bayonne, and 2,000 employees; Société Morane Saulnier, with plants at Puteaux and Tarbos, and 1,400 employees, and Société Industrielle pour l'Aeronautique, whose plant at Suresnes employs 681. There are also numerous smaller airplane manufacturers employing less than one hundred personnel.

If one discounts the British aircraft industry, France has the largest aircraft industry in Western Europe and, although it has been confronted by manifold difficulties during the past five years, there is now good reason to believe that French airplane manufacturers will shortly begin to play an increasingly important part in the supply of combat airplanes for the defense of the West. Obstacles of a financial and political nature have been systematically removed and France will equip her combat element with more and more home-built airplanes during the coming year. END

ADIZ

(*Continued from page* 34)

and report the failure as soon as possible. In case of emergency, a pilot's judgment is justification enough for changing his plans. He must, however, let CAA know as soon as possible what happened.

Since DVFR still can't give pilots permission to sail across prohibited areas, it is still necessary to watch out for them.

Generally, unless a pilot really riles the CAA and persists in committing a long string of flagrant CAR violations, government reprisal is fairly mild. This ADIZ business is extremely rough though. In the stiffest set of penalties ever set up, a fine of up to $10,000 and/or a year's imprisonment can be imposed on the grounds of "knowing and willful violation of the ADIZ requirements."

As strict as the domestic rules are, the Alaskan directives are even heavier. It's easily understood after a quick look at a chart. At one point Russian territory is only 30 miles from Alaska.

The ceiling for no-radio or flight plan activity is only 2,000 feet over immediate terrain. This is hard on the pilot, since in Alaska almost any flight takes an airplane over very high hills. But 2,000 feet it must be. Also, no planes without radio and flight plan may cross the Canadian or Alaskan borders without very complicated special permission to be granted by CAA and the USAF Defense Command. Over waters surrounding Alaska and the Aleutians, no planes may fly unless they file DVFR flight plans, regardless of altitude. Needless to say, the altitudes, both Domestic and Alaskan, must be rigidly adhered to.

HOW LIGHTPLANES ARE USED

NON-AIRCARRIER USE	NO. OF PLANES
A. Agricultural	
1. By farmers, ranchers, etc.	7,481
2. By commercial sprayers	4,234
B. Industrial	
Aerial photography, surveying, patrol, etc.	1,587
C. Instructional	11,919
D. Transportation for Hire	
Passenger, cargo, contract, etc.	3,376
E. Business	
Other businesses or professions	18,244
F. Federal, State, and Local Governments	1,066
G. Pleasure and Sports	10,801
H. U. S. Aircraft out of U. S.	836
TOTAL ACTIVE NON-AIRCARRIER AIRCRAFT	59,544

This table shows that about 89% of the active civil, non-aircarrier fleet is being used in some type of business or industrial flying. A potent argument against grounding, to be sure!

Should a state of war be declared or an attack become imminent upon the U. S., the Defense Command plans to shut down the ADIZ areas to include the airspace below the minimum altitudes. Any flight made outside visual recall distance of the home airport must file DVFR or DIFR flight plans. In other words, no point to point flights can be made at all unless these flight plans are filed.

Here is the point that hurts: To obtain approval of these defense flight plans, a plane must be equipped with functioning 2-way radio. Yes, even the smallest trainer. Visual recall distance, at best, will be only about five or 10 miles away from the airport. Therefore, plane owners in ADIZ zones would be wise to begin thinking of some two-way radio installation in their ship. Waiting until the last minute may mean that the plane will be grounded due to lack of radio.

In the coastal ADIZ planes must comply with ADIZ requirements regardless of altitude. This hasn't bothered many lightplane pilots since few of them care to venture far from land without radio equipment and flight plans as safeguards.

Instead of screaming, most civil aviation organizations seem to have taken the

new restrictions to private flying quite calmly. This is due to the efforts of the joint USAF-CAA Air Defense Planning Board in Washington. Thanks to the efforts of this board, no abrupt and arbitrary grounding of the personal airplane is expected. During the last war in some places lightplanes were forbidden to take to the air, with rare exceptions. Now, a better organized system of control, radar, and the intensive efforts of civil organizations and CAA to show the utility and use of lightplanes today has resulted in quite a logical set of rules.

No one can object to the military's desire to know who is in the air and where in such unsettled times. Nor can we seriously doubt that their rules are necessary. Pilots themselves will welcome a warning to veer away from areas where if we come to a point where an attack has been made or is approaching. As soon as an attack is over lightplanes will bounce back into the air in the order that they come on a priority list.

First off the ground, of course, will be civil and CAP planes needed to bring in medical supplies and personnel, reconnaissance and patrol flights, and similar service flights. Next will probably be essential industry flights and business flights and last, personal flights.

The Joint USAF-CAA Planning Board has made every effort to avoid appointing ADIZ zones in areas where the population count is high with a corresponding number of aircraft. The densely settled parts of New York, Washington, D. C., Ohio and Pennsylvania are surrounded but not included in Air Defense Identification Zones. This leaves pilots in these areas free to fly as they please.

The Minneapolis ADIZ does cut into a heavily populated area. Some discussion arose over this restriction of civil flying. In the end, though, the military were able to prove their need to protect several vital areas by using this ADIZ.

The Joint USAF-CAA Planning Board had a job of education on its hands when it was organized early last year. First the military had to be convinced that private flying had outgrown the "flivver" stage and was not only helpful to the nation's economy but downright essential in many things.

The estimated 4,000-aircraft increase in crop dusting was one factor that helped demonstrate civil aircraft use. Another was the growing use of corporation aircraft. At Washington National Airport, for example, a daily average of 150 to 170 itinerant aircraft arrive and depart. Even instrument weather has from 40 to 100 itinerants landing and taking off.

A survey made by the CAA showed that there are 59,514 non-carrier planes flying. This was perhaps the most vigorous argument developed—and one that had a large part—in showing the military that civil planes were no longer Sunday flying machines.

Civil flyers needed education too. The military have had to stress the very real need for pilots to stay entirely out of prohibited areas and to comply religiously with ADIZ requirements. It would seem that they are succeeding. Each month less violations occur, the Air Defense Command reports. Each violation means that fighters must "scramble" to the errant aircraft, take a look at it and report back to Air Defense. Automatic alert systems and defense preparations are alerted. They wait in readiness until the Air Defense command plane can find out whether an enemy aircraft is approaching or whether some wandering civil pilot has buzzed obliviously into the prohibited area or gotten off the "ADIZ beam."

Civil pilots are learning that such carelessness is closely akin to turning in false fire alarms. Obviously, the air defense planes must answer all calls since the one they might skip would be the one to bring possible disaster.

It was a trifle disconcerting to pilots to suddenly note the absence of radio-range signals from their earphones during the last war. This quite often occurred when local commanders thought that enemy planes were approaching and ordered radio ranges and other navigational facilities off the air.

What's the alternative? Today, aviation is no longer a clear weather deal. Planes come and go almost without regard to fog and other weather. The goal of 100 per cent all-weather flying is very close indeed. We now lean strongly on the electronic aids developed and built into a complex and accurate network across the nation. These simply cannot be shut down without warning at the discretion of local commanders. Neither can navigational facilities be left on to lead the enemy in and aid him in pinpointing his target areas.

The joint board has come up with what sounds like a very workable solution. Air traffic approaching areas of attack or imminent danger will be warned away. This is one of the reasons for the two-way radio and visual recall requirements in the zones.

"Traffic will be diverted in an orderly, prearranged pattern," an official of the planning board stated, "and directed to airports with long enough runways and the landing aids necessary to get them down safely. Personal planes will be warned right along with civil. In fact, personal planes will be easier to disperse since they need no elaborate airport and for the most part will be flying VFR weather."

Even though restrictions are hampering certain pilots who need to fly over 4,000 and haven't the two-way radio required, the rules are reasonable. During a war even more delays and restrictions will chafe the personal plane owner. Still, we will be able to fly and continue to use our planes. This represents a large step forward in the lightplane field.

The best way to insure our continued use of the airspace and military cooperation in helping us to keep flying is to observe their ADIZ area rules to the letter. The fewer interceptions the defense command has to make the more confidence the Air Force will have in the ability of civil flyers to observe necessary security regulations. The fewer times pilots wander through prohibited areas the more officials will do to let them stay in the air during a war. END

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NOTES ON CIVIL FLYING

Storm Warning

The British are giving the weatherman some stiff competition with the development of the *Searcher*. The new radar device will be installed in the nose of the *Comet* jet airliners.

The *Searcher* has a high-frequency beam which covers a sector of space ahead of the aircraft. Any storm-filled cloud or other object with a "hard" center in the wedge-shaped sector of space covered by the beam will automatically be screened. Distances are marked off on the screen and the pilot can determine the range of the storm ahead to within a few hundred yards.

The radar pictures show hidden gaps through giant cloud banks which are hidden from the human eye. This way the pilot will be able to select a storm free path and avoid dangerous turbulence, and make a rouble-free climb or descent through the storm clouds.

Piper Doings

William T. Piper has announced the formation of a special agricultural development group. This enables the Piper Corporation to conduct experiments in developing improved dispersal units for the aerial application of agricultural chemicals.

The group, headed by Rex Taylor, Chief of the experimental division, Alfred B. Munroe, veteran agricultural pilot, and Howard Piper, assistant to the president, will also conduct continuing experiments on improved flight equipment.

Incidentally, the corporation has a new ferry pilot. In order to meet delivery schedules all qualified pilots at the plant had to pitch in to get the L-21s to the Army. The call to duty was answered by the company's 70-year-old President (below), who took over some of the ferrying chores personally.

Big Wing Piece

Engineers at Lockheed have solved the problem of building tomorrow's aircraft larger, faster and stronger without adding weight. They have created the largest single piece of aircraft wing ever made.

Designed for the wing of the Super *Constellations*, the one-piece 323-pound aluminum alloy panel saves hundreds of man hours and thousands of dollars.

Each strip eliminates about 5,000 rivets and the project to devise this pioneering process took six years. Integral stiffening is the key to the technique. Formerly wing sections were built of a framework of small, riveted pieces covered with a thin metal skin.

The new method is to make such sections by cutting channels down the length of $1\frac{3}{4}$ inch thick slabs, leaving standing ribs almost 3/16 inch thick as stiffeners.

Nautical Miles Changeover

Looks like the standardization of distance and speed measurements in aviation, discussed in 1950, is shooting ahead. With the target date July 1, 1952, the CAA, CAB, Weather Bureau and Coast & Geodetic Survey are getting down to serious planning of the conversion to nautical miles and knots.

The USAF and Navy adopted the nautical system in 1946. Therefore by the 1952 date there will be a common military-civil standard. Toward that end, a proposed educational program covering the change proposed by the Aviation Development Advisory Committee is being initiated.

There certainly should be sufficient time for pilots, airlines, government agencies and all others concerned to make the changeover as smoothly as possible.

Seaplane Altitude Record

Harold E. Mistele has gotten the nod on his altitude flight in an Aeronca sedan seaplane September 3. His official altitude, listed as 20,169 feet, is the record for seaplanes.

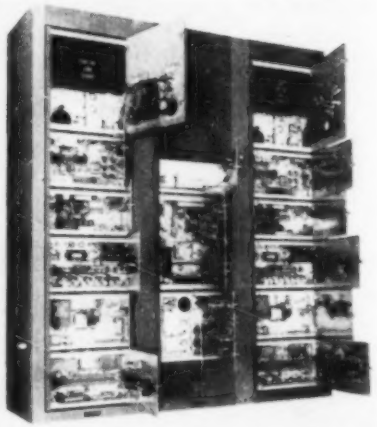
The aircraft was equipped with a Continental 145 h.p. engine and Edo floats.

Omni Has a Partner

A pilot flying the Chicago-New York Airway can pinpoint his distance with an accuracy of a fraction of a mile. DME—distance measuring equipment—is the reason.

Federal Telecommunication Laboratories have delivered such units to the CAA, for installation at CAA radio-range stations in Caldwell, N. J.; Selingsgrove and Phillipsburg, Penna.; Youngstown, Cleveland and Toledo, O.; Millersburg, Ind., and Chicago.

Used in combination with the omni-directional radio-range which provides direction, the DME equipment makes it



possible for a pilot to obtain a constant and accurate check on his position without the necessity of computations.

The CAA has installed the airborne equipments on their own patrol plane and they are also supplying some of these units to commercial airlines.

The DME in the aircraft sends out a radio signal and automatically measures the time required to complete a round trip from the plane to the ground station. It translates this information into nautical miles which are read on a dial in front of the pilot.

(*Continued on page* 64)

LOGGING TIME

WITH HY SHERIDAN

Captain, American Airlines

SHADES OF SUPERSONIC

The Air Force has a pretty good cure for impatience. At least it works on me.

The pilots of the supersonic planes say that they can't turn. One of the pilots said that on a recent flight he wanted to turn, banked vertically, and couldn't. All of which goes to prove that these planes need different controls. The old ones are not adequate. In fact, the way they are now you have to make up your mind where you want to go before you start.

Shucks, you can't even turn out of the way of one of those little radio boxes that the authorities are floating in the upper levels, charting the currents in the ocean air. I asked one of the supersonic pilots what would happen if he hit one of those things while he was going at supersonic speed.

"I would vanish," he said, "like a gambling witness."

"They wouldn't find anything of you at all?"

"Nope. Why, they wouldn't even find a rumor of me."

So your modest reporter paddles along, contented enough, in a 300 miler. I'm like the aging captain that Sadie talked about. "He ain't so fast as a lover any more," she said "but he doesn't begrudge the time none."

* * *

HUH?

So many of the safety bulletins of the officials of the airlines and of the CAA remind me of that historic General Order No. 1 that read tersely:

"There will be no more forced landings in the Hawaiian Department. By order of Charles P. Summeral, Major General, Commanding."

* * *

BRAIN DISTRUST

According to my spies in the CAA offices, there is a plan on foot to have all commercial pilots tested with the encephalograph, a device which registers your brain waves.

This plan is a brain storm itself. You see, brain waves differ. Some people are sort of ground swells. Some people like us captains, are regular combers. In some people's craniums there are now and then bores, like the Tsientang bores. This category may not include the story-telling bore, the bulletin bore, and so on.

Some people are breakers. These are executives who know in their hearts that they have no ability to lead, and so they are always implying, "You do as I say or I'll break you."

Some people are nothing more than ripples. This may be the best kind. A thought can navigate around their brains without being capsized. But in others the white caps make up and then the tumbling seas will crash; their thoughts sound to them just like an empty conch shell does to us.

Well, here's to your brains, pilots, long may they wave!

* * *

TRAVEL NOTES

As most of you know your reporter flies to Mexico and the stories told of the American are often highly amusing. This is one of them.

On one of the sightseeing tours one of the yanquis was complaining to the guide, "In this language everything is either feminine or masculine."

* * *

Mr. Stalin's policy seems to be summed up in: "What's he got that I haven't got?"

* * *

THAT'S LIFE

It's a funny thing, but on the airlines a first officer has no respect at all for the captain until the former has been a captain himself for a while.

* * *

The CAA asks us to watch out and not hit other airplanes. Must be running short of taxpayers.

* * *

SICK MAN

A member of the president's economic committee fainted the other day and he had to be treated for shock. He had gone to the doctor for a routine checkup and the doctor gave him a good one and finished by saying, "You're as sound as a dollar."

* * *

THE ETERNAL TRIANGLE

"Well, I guess history repeats itself, all right," the jet pilot said as he skoonched into his delta plane. "The first thing that they put on me was a triangle, and here we go again."

* * *

DO YOU REMEMBER WHEN?

The most acute problem in aviation was to get a wing "dope" for the fabric so that the cows wouldn't eat off our flippers?

* * *

ASK A SILLY QUESTION

A woman passenger called the stewardess. "Do my eyes deceive me or are those wings actually bending?"

"Oh, your eyes are all right," Sadie replied. "You see the captain bends the wings over the bumps."

* * *

PIPE DREAMS

"Anyway, it wasn't pilot error."—CAB inspector.

* * *

EPITAPH

The high winds once did whistle in his ears
But now the soft munch of pallid worms
He rode the smooth, the warm, alluring tide
Of wanton night, so still, until
His engine died.

NORTHROP STUDENT
JIM WILSON

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Back-seat Pilot

(*Continued from page* 31)

of experimental flights to find out how perfect their pants' reactions were. The results astonished the pilots as well as the CAA investigators. These veterans of thousands of hours knew but little more about detecting stalls by SOP techniques than amateur pilots. These "graybeards" were quick to appreciate the conclusions of the tests.

Indeed, the gadget has been known to operate in very rough air at 120 m.p.h. in level flight. Discounting the possibility that bouncing may have flipped the tab occasionally, certainly gust loads can create a near stall condition and actuate the switch.

The Sunday pilot needs SWD. Flying but once a week or once a month, his rear-end is not as sensitive as is sometimes required. We've all heard the hangar boys telling about, ". . . there I was on instruments without instruments . . . all of a sudden the altimeter started unwinding . . . I broke out . . . it was a close one . . ." If one does get caught in the soup and the horn blows, he'll push that stick a little ways forward.

One might note that in 1948, pilot error accounted for 90 per cent of the 850 deaths in non-air carrier flying. Of these 210 people died from failure to maintain flying speed. This is about 20 per cent of the total. Please note that 15 per cent of these held commercial tickets.

In 1949 in non-commercial flying (that's us) there were 276 accidents as a result of failure to maintain flying speed. In 1950, the figure lowered slightly to 255. All of these were the direct result of failure to maintain flying speed.

It can not be said as a fact that these people would still be living had their aircraft been equipped with stall warning devices. But we know that if the pilot had the benefit of the warning he would have taken remedial action. The average pilot wants to keep on living. He has been disciplined in what can happen. It would seem logical to believe that most of these accidents could have been avoided had the pilot been aware of the impending stall.

The CAA has stated that it does not have "sufficient exposure data to evaluate the stall warning indicator from the standpoint of accident prevention. It has definitely stated that it feels that a good indicator can do much in helping pilots to keep existing aircraft out of stall accidents. Since buzzing accidents appear in 'failure-to-maintain-flying-speed-tables,' some of these cannot be eliminated. But certainly if we can save say 100 pilots and passengers per year with one gadget, we've done pretty well." To paraphrase the popular slogans, "Fly safely. The life you save may be your own."

In 1949 out of 6,000 aircraft equipped with devices, only one was involved in a stall-spin accident. My old friend, Omar Midyett, who runs the Lakeside Airport in East St. Louis has used warning devices on all his training planes for over two years. This adds up to better than 50,000 flying hours. He reports that he has eliminated stall accidents at his operation. Gordon Lackey, old-time flyer and distributor of Cessna in Indiana, thinks they "are a grand thing."

Dusting and spraying operations call for the utmost in pilot skill. We know that these men—some 6,400 of them—must have had at least 1,000 hours to qualify. It is reported that it takes an average of a season and a half to properly train them after they have the prerequisites. According to the records, crop control led all the rest of commercial operations in accidents per 10,000 hours in 1949. Pilot error caused 56 per cent of the non-fatal accidents. Failure to maintain flying speed, under the heading of "pilot error," caused 62 of these accidents in 1949 and 73 in 1950. These pilots relied on their respective seats.

In fairness to the dusters themselves, Herb Rayner, professional duster of Stuttgart, Ark., states that ". . . the planes have a constantly varying gross weight and therefore a constantly changing stalling speed, and critical angle of attack proportionate to the varying load condition." His opinion is that a SWD could not operate within the exact shades above stall that are necessary in this profession. They have been tried down in Arkansas and the opinion was that they were more of a "hindrance than a help."

A wartime military instructor told me of check flying dozens and dozens of applicants for instructors jobs. These candidates were veteran pilots. I asked him if the more hours a man had made a difference in his stall perception. He replied that it did not. For example, one man had 5,000 hours and was disdainful of the whole procedure. This applicant rode through the series of tests and missed the approach to the stall several times. He was disgruntled when refused an appointment to instruct.

I believe that stall warning devices are here to stay. They are useful in the entire stall series, including high speed stalls, verticals and normal acrobatics, turbulent air, heavy loadings, landings and take-offs, and most of all, that man-killer—the inadvertent stall.

Leading insurance companies offer lower rates when your plane is SWD-equipped. Many of the aircraft manufacturers now include safe flight indicators as standard equipment. The balance offer it as an extra. Many military and naval craft come SWD equipped. At least one major air carrier uses it.

Just before the last war, a Rearwin *Cloudster* distributor demonstrated his personal ship to me. We were at 2,000 feet in a clear June sky. He pulled the ship's nose way up to demonstrate the perfect control one had with this model plane. Before either of us knew exactly what had happened, we had completed three turns of a tail-spin. We brought the ship out with a margin to spare. Every now and again, I wake up from a deep sleep and shudder at what would have happened had we been at 500 feet in that demonstration. Yes, stall warning devices can even help old-time, Rearwin distributors. END

Good old Bertram! Still insists on flying by the seat of his pants.

Mike Talk Technique

(Continued from page 33)

sion. Whiting Field has adopted the following phonetic alphabet as SOP:

Letter	*Spoken As*	*Letter*	*Spoken As*
A	Able	N	Nan
B	Baker	O	Oboe
C	Charlie	P	Peter
D	Dog	Q	Queen
E	Easy	R	Roger
F	Fox	S	Sugar
G	George	T	Tare
H	How	U	Uncle
I	Item	V	Victor
J	Jig	W	William
K	King	X	X-Ray
L	Love	Y	Yoke
M	Mike	Z	Zebra

To distinguish numbers from words similarly pronounced, the students are instructed to use the word "numeral" preceding such numbers. The phonetic numeral list is:

Number	*Spoken As*	*Number*	*Spoken As*
0	Zero	5	Fi-yiv
1	Wun	6	Six
2	Too	7	Seven
3	Thuh-ree	8	Ate
4	Fo-wer	9	Niner

With this system, the number 44 is pronounced as Fo-wer Fo-wer, 90 as Niner Zero, 136 as Wun Thuh-ree Six, 500 as Fi-yiv hundred.

In addition, the new cadets are made to learn correct usage of certain prowords, which are single words or simple phrases that add brevity to communications. Some of these prowords are:

Proword	*Meaning*
Correction	An error has been made in this transmission. Transmission will continue with last word correctly transmitted.
Read back	Repeat this entire transmission back to me exactly as received.
I read back	The following is my response to your request to read back.
Say again	Repeat all of your last transmission.
I say again	I repeat, for clarity.
Wait	I must pause for a few seconds.
Over	Transmit; a response is necessary.
Roger	I have received your last message.
Wilco	I understand your message and will comply.

Using the phonetic system and prowords, a student demonstrating for the Speech Intelligibility class would identify himself over the radiotelephone in this manner:

"I am speaker number wun, John Jones. I say again, I am speaker number wun, John Jones. Jig—Oboe—Nan—Easy—Sugar . . . Jones."

Every radiotelephone message is composed of three basic parts: the heading, the text, and the ending. The heading is directed to a certain aircraft or control tower, and it must identify the receiver as well as the speaker; the text is the message or request for information; the ending must employ the use of a proword, either "over" or "out," so that the receiver will know if an answer is expected or not.

The students, numbering up to 36 in a class and each wearing a headset, take down their version of the speaker's message on specially provided scratch sheets. If they do not understand the speaker's words, it is a mark against the speaker and indicates that he requires further instruction.

Each student in the class has his opportunity to address the other students over the radiotelephone and receive his grading for clarity. But the instructors do not make this transmission job as easy as it sounds. They have special equipment which can inject static or other noises that would be encountered under flight conditions. But regardless of the interference, the student's message must be understood by the receivers.

The Navy has found that certain words are apt to be misunderstood over the radiotelephone, and the students must repeat these in his demonstrations to the class. As example, the words gale, jail, dale, bail. Try saying them yourself with someone on the other side of the room taking down his version of your words. As another test, try the words dipper, clipper, slipper, flipper.

Because of the similiarity of so many words in the English language, the cadets are cautioned to choose their words carefully, grouping words so that the idea they wish to convey is clear and can have but one possible meaning.

In addition to proper mike usage, the class is also shown how to use their headsets properly. The headsets must be worn properly both for comfort and to eliminate interfering noises. Headsets that fit too loosely may easily fall or be blown off. For proper fit, the covered headset bands should be separated as widely as possible. The earphones are then pulled down as far as the sliding rods permit and placed over the ears with the exact center of each phone directly over the opening into the ear. The seal around the ear can be tested by pushing inward against the center of the earphone.

The headset must be in correct position at all times in order to keep ears adapted for optimum listening conditions and to receive communications at highest signal strength.

No matter how clearly transmitters speak, it is lost if the receivers do not develop the knack of listening in noise. Since this can come only with practice, it is emphasized during the entire session of the intelligibility course. Proper listening is as important in communications as clear speech.

The Whiting Field speech intelligibility course was originally established as an experiment, but it has proved so successful that it has now been adopted as a permanent feature of basic training. The Navy feels sure that it will help to reduce accidents caused by poor communications and misunderstanding.

END

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MiG Alley

(*Continued from page* 14)

All American jet fighters now in Korea carry only .50 caliber machine guns, basically the same as the .50 installed on most World War II piston engine planes but with increased rate of fire. Current fifties can fire at the rate of 1,300 rounds per minute. Six of these guns give a plane terrific firepower.

The MiG has been carrying two 20 or 23 millimeter cannon in one wing and one 30 or 37 millimeter cannon in the other wing. The rate of fire of these guns is much slower than the fifties in American planes, giving our pilots greater firepower. But both the MiGs' cannon and our machine guns are effective weapons if they can connect with the target. The trouble in MiG Alley is that only on rare occasions, considering the vast number of planes sent into the air by each side, do enemy or UN pilots get in good, sustained bursts.

Scores of American *Sabres* and *Thunderjets* have returned to home base with gaping holes in fuselage, wing or tail, attesting to the striking power of the MiGs' cannon. But the great number of MiGs damaged or probably damaged also reveals that UN pilots are getting in bursts but not sufficient to result in kills. The superior firepower of UN fighters is not great enough to increase the total of enemy planes destroyed under the combat conditions existing in Korea.

Questioning the wisdom of using .50 caliber machine guns instead of cannon in today's fighters is second-guessing military experts. It is evident, however, from published reports and conversations with Air Force pilots that the fifties are not producing the desired results. It takes an amazing number of .50 caliber hits to bring down a MiG and in single-pass fighting the number of hits is extremely limited. The fifty looks even worse when it is known that the Russians are building airplanes with thick skins and "beefed up" internal structures to withstand heavy fire.

The problem of new armament looms large right now, and it is known that the Air Force has in development jet fighters designed to carry 20 millimeter cannon.

****

"Commercial planes now usually work at speeds of from 60 to 90 miles an hour. In a year these limits should be from 110 to 150 miles an hour. Probably 200 miles an hour will be the limit in a few years. Cruising radius will be increased when fuel consumption is improved and structural weight reduced. Both are going on in a small way every day." Comdr. Richard E. Byrd, USN, Forum Magazine, August, 1928.

****

Whether that change, bringing with it decreased firepower but more punch per hit, will solve the riddle is pure speculation. There also is the report, unconfirmed by military circles, that tests also will be run on a plane carrying a combination of armament—perhaps cannon and machine guns.

Another development in the scramble to iron out the armament problem lies in the field of rockets. Work is going ahead on single-shot and scatter shot rockets of high velocity as a possible replacement for or supplement to standard machine guns and cannon on jet fighters.

Most promising rocket for jet airplanes, one that has the velocity needed, is the 2.75-inch "Mighty Mouse," which was developed by the U.S. Navy and has been adapted to Air Force planes. As many as 24 of them can be fitted to the average jet fighter and they can be fired in salvo.

No rockets with velocities approaching that of the .50 caliber machine gun or the 20 millimeter cannon (which has a muzzle velocity of 2,900 feet per second) have yet appeared in the Korean theater. The 11.75-inch "Tiny Tim" and the 5-inch "Holy Moses" rockets have been used effectively in tactical operations against ground installations, tanks and trucks, but they are not suitable for air-to-air combat.

Many factors must be taken into consideration in attempts to solve the problem of armament. These include target vulnerability, limitations of airplanes, weather conditions, abilities of pilots and over-all strategy. But every armament problem encountered in the air has been solved successfully and there is no reason to believe that the current one will not be so solved.

Korea, after all, is a laboratory where military experts have their first opportunity to test new planes and new weapons against an enemy which is producing them in quality equalling and at times surpassing our own. It is a period of trying new tactics and weapons in a new type of air war and while the boxscore of planes destroyed is only a small percentage of the total planes engaged the UN forces have held the advantage from the beginning. Superior Allied technical knowledge and its application to existing problems will, it is believed, keep the edge we have won. END

Aerial Warfare

(*Continued from page* 18)

the target, track and attack the target, then navigate the interceptor back.

Several different types of control are represented in such a mission. For example, the target will originally be located by ground-based, long-range radar capable of detecting enemy aircraft up to ranges of 1,000 miles. The information obtained as to bearing of the target will be manually set into the system by the "pilot," after which the aircraft will takeoff, climb to cruise altitude, then navigate to the vicinity of the target. At this point, airborne radar in the interceptor will take over, search for the target, identify it and begin to track it.

While tracking, the system will automatically maneuver the airplane into the attack position. At the proper instant, calculated to yield the best "kill" probability, small guided missiles or rockets will be released automatically. After sufficient time has elapsed for the system to determine the results of the attack, automatic evasive action will begin. The system will then return to automatic navigation, either to another target area or home.

At the home base, an instrument landing pattern (ILS) will be automatically entered and the plane brought down to touchdown. The action in any phase of the sequence will be automatic; the pilot's job will be to determine when to switch from one phase to the next.

****

"Military Air Supremacy can best be assured by the intensive development of industrial air organization for commercial purposes. The conception of civil aviation as the mainstay of our power as a whole is right. Service aviation is bound by technical and financial flights; its scope is confined to the requirements of war. Civil aviation, on the other hand, opens out a prospect of productive expansion." Major General Sir F. H. Sykes, "Aviation in Peace and War," 1926.

****

Naturally, the exact way in which all these things are accomplished is cloaked in the wraps of military security. One device which is needed, however, and which is really the heart of the system, is an automatic calculator or "computer." Much has been written in the press regarding these high-speed electronic "brains," but instead of occupying hundreds of square feet of space, the computer to be installed in the interceptor airplane will use subminiature parts, so small that a conventional radio receiver would easily fit into the palm of one's hand.

The development of automatic flight-control fire-control proves beyond a doubt that progress toward an obsolute weapon, one capable of either preventing wars or winning them, is as inexorable as fate. The road from Mons Meg, to Big Bertha, to the V-2 and the atomic bomb is rapidly leading toward fully-automatic airplanes and guided missiles, capable of pinpointing any target on earth.

American scientists and engineers have decided to stop this trend. Having already developed two of the three decisive weapons of World War II—long-range strategic bomber and the atomic bomb—they now have given us a weapon which might well prove decisive in World War III. It is this engineering and scientific genius exhibited by Americans, particularly in the field of electronics, against which Russia cannot hope to compete either quantitatively or qualitatively. It is the trump card held by the forces of individual freedom against the gathering glacier of collective slavery. END

CIVIL AIR PATROL

WING TALK

Lauds Blood Lift

FLYING'S special commendation goes this month to Col. Donald D. Webster's National Capital Wing for being the first in the nation to undertake regularly scheduled flights to deliver blood from Washington, D. C., to nearby cities and military bases.

Flights now leave the District of Columbia every Saturday morning. One flight supplies cities northeast of the nation's capital in addition to the U. S. Army base at Fort Meade, Maryland; Phillips Army Base and Edgewood Arsenal at Aberdeen, and the Navy Training Base at Bainbridge. Flights to the northwest stop at Hagerstown, Maryland; and Martinsburg and Charlestown, West Virginia.

Additional flights will get underway soon to Front Royal, Harrisonburg, Culpepper, and Fredericksburg, Virginia; the Marine Air Station at Quantico, and the Naval Air Test Center at Patuxent, Maryland.

The weekly blood flights are directed by Lieut. Col. Donald T. Speirs, Operations Officer of the National Capital Wing. Blood is supplied by the Washington Regional Blood Center of the American Red Cross.

This new service has already received the attention of Congress. Representative Edward H. Jenison, of Illinois, in reporting the inauguration of the aerial blood delivery service in the Congressional Record, stated that it was "further evidence of the great value of the Civil Air Patrol and the indication of willingness and readiness to cooperate with every agency in meeting our present crisis."

Radio Stations

CAP'S RADIO NETWORK now numbers nearly 10,000 FCC-licensed stations, three-fourths of which are mobile. Regional Net Control Stations, their locations and call signs are: National NCS, VPØ, Washington, D. C.; Region I, VPØAF, Meriden, Connecticut; Region II, VPØBB, Kearney, New Jersey; Region III, VPØBE, Charlotte, North Carolina; Region IV, VPØAT, Detroit, Michigan; Region V, VPØAU, Minneapolis, Minnesota; Region VI, VPØAE, Denver, Colorado; Region VII, VPØBS, Spokane, Washington; Region VIII, VPØAD, San Francisco, California.

Regional Frequencies

Region	*Day*	*Night*
I	2764 kc	2082 kc
II	4427.5	2618
III	4427.5	3312.5
IV	4350	2764
V	4427.5	3312.5
VI	6655	4477.5
VII	6655	4350
VIII	6655	4350
National	4275	7920

The CAP Blues

IT'S OFFICIAL now. "Blues" for CAP, that is. Official Air Force Regulations 45-16 and 16A have been distributed to all CAP units, prescribing the new uniform and its proper wear.

Except for special patches, brass and buttons, the new outfits are just like the new Air Force togs, although CAP is authorized use of white shirts for both summer and winter wear. Basic color of the winter uniform is Shade 84, while summer garb calls for Shade 193, or "silver tan."

CAP personnel will buy their own uniforms with purchases authorized through commercial sources or at USAF exchanges. As yet, USAF clothing stores may not sell uniforms to CAP personnel.

According to CAP Headquarters, wearing of the old uniform is authorized until further notice.

Disaster Role

THE RECENT half million-dollar disaster which struck Brighton, N. Y., taking three lives and injuring 26, demonstrated CAP's value as an emergency organization. Within 25 minutes after the first blast shook the city, CAP radio units and rescue workers were on the scene. Fourteen mobile support radio cars sped to the devastated area as regular telephone service was jammed by calls from anxious relatives of persons living there. Five fixed stations immediately joined the emergency communications network and four CAP planes stood by for possible evacuation flights. CAP cadets played an important role as messengers.

Scholarship Plans

CAP LEADERS are laying plans for $10,000,000 Aviation Education Scholarship Foundation. The proposed multimillion dollar project was revealed to the Aeronautics Committee of the American Legion during the Miami Convention by CAP's Deputy Commander, Colonel Early E. W. Duncan, who appealed for Legion support.

Colonel Duncan told the Legionnaires that the foundation would provide a means by which worthy CAP members could increase their aviation education. He said that detailed plans for execution of the scholarships are yet to be worked out. "We anticipate," he said, "that the scholarships will be awarded both on an undergraduate and graduate level. They will call for periods from three months to four years of formal and practical aviation studies."

Subjects to be studied include electronics, flight engineering, aeronautical engineering, airline and airport operation and management, and teacher training in aviation education. Flight and aircraft and engine mechanics scholarships would also be made available.

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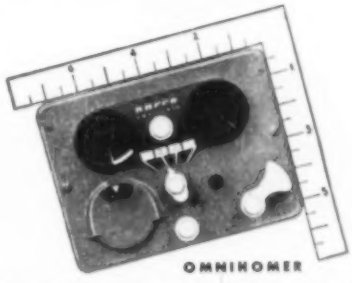

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Radar In Miniature

(Continued from page 19)

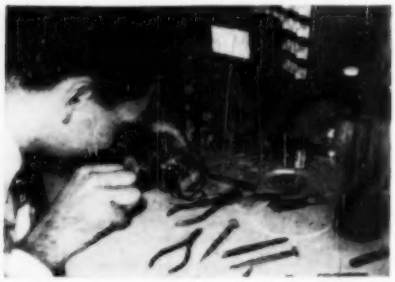
ture problem changes. In this region, it is extremely cold (—60° Fahrenheit). Thus, it might actually become necessary to introduce heat, such as through the use of heater strips similar to those in an electric toaster.

At high altitudes, pressure can reduce the effectiveness of insulation which is protected by air at lower altitude. To overcome this difficulty pressurization of the electronics packages may be required and can be achieved by enclosure in a cylinder containing air or an inert gas.

Vibration and shock also create problems difficult of solution. Although the subminiature radar station is composed of very rugged components, the severe vibration and shock to which the system is subjected necessitates the addition of carefully designed and located shock mounts and vibration dampers.

In the procedure of subminiaturization, the electronic designer often begins with standard size parts to establish the values of the components and to prove the "paper" design. Then the parts are reduced to subminiature size, and are placed on an experimental panel known to the engineers as a "breadboard." The parts are comparatively widely spaced to make the unit easily accessible for adjustment and change. Then the parts are gathered together on a circuit panel to establish their overall functioning ability before the required degree of compactness is achieved.

Now comes the arduous period of testing for practicability. Not only must the electronic brain occupy a minimum space to perform its intelligence mission, but it must be rugged, adequately cooled (or heated, as the case may be), accessible to work on, and suitable for large scale production. It must "think" without hesitation and with pinpoint accuracy while traveling at tremendous speeds and, above all, it must be reliable. Individual items of equipment must exceed the reliability factor of the total assembly by a wide margin.



Using a jeweler's tools and magnifying glass, this Ryan electronics engineer is wiring a packaged subminiature circuit.

Development of subminiature radar systems by Ryan Aeronautical Company has been a logical outgrowth of research work on its rocket-propelled "Firebird" air-to-air guided missile as well as its other projects. END

Do You Remember...?

"WRONG WAY" CORRIGAN

By BILL BULLOCK

ON THE morning of July 18, 1938, a weatherbeaten old Curtiss Robin glided slowly down through a heavy overcast and landed at Baldonnel airport, near Dublin, Ireland. Puzzled airport officials looked on in openmouthed astonishment as the dilapidated airplane slowly taxied up to a hangar and stopped.

Out stepped a small, slim lad who told the officials that his name was Corrigan—Douglas Corrigan—and that he had just flown in from New York. Could they please tell him where he was? When the bewildered officials told him that he was in Ireland, Corrigan expressed genuine amazement. Hastily, he explained that he had taken off from Roosevelt field in New York and headed for Los Angeles. Something surely must have gone wrong with his compass!

"Gee whiz," he muttered, "and I thought I was somewhere in California!"

This "cock and bull" story that Corrigan told about his flight to "California," and the compass going haywire, amused the Irish people, and kept the entire world chuckling for months.

A few days before his famous "wrong way" flight, Corrigan had flown his $900 plane non-stop from Los Angeles to New York, telling newsmen that his aerial jaunt across the country was only a pleasure hop—a little vacation from the daily grind in California. Spending a few days in New York visiting friends, Corrigan announced his intention to fly back to the west coast non-stop, and on July 17 took off from Roosevelt field and apparently headed for California.

The Robin carried 320 gallons of gasoline in a special fuselage tank, and the regular wing tanks. Twenty-eight hours later he landed in Ireland. The gasoline tanks were almost dry!

Powered by a Wright J6-5 engine that developed 165 h.p., the 10-year-old plane had a top speed of only 100 m.p.h.! The fuselage had been modified considerably. The pilot's seat was moved aft to the position normally occupied by the double passenger seat, to make room for the big fuselage tank. Forward visibility was very poor. To see ahead Corrigan had to look over the tank and through a space about six inches high!

There was one piece of special equipment carried on the flight. Afraid that he might run into severe icing conditions, Corrigan took a 12-foot carpet pole along, and when the wings began to "ice up" he calmly leaned out the window and knocked the ice off!

Douglas Corrigan

After a thunderous reception in Ireland, Corrigan brought his famous Robin home by boat. He fully expected to get a severe reprimand from the Bureau of Air Commerce, but Dennis Mulligan, then its chief, and a loyal son of Ireland himself, stuck his tongue in his cheek and forgot the whole thing.

In an attempt to cash in on his "wrong way" flight, Corrigan took the Robin on a tour of the United States. Later he went to Hollywood where he played the leading role in a movie of his flight to Ireland. Shortly afterward, Corrigan dropped out of the limelight and wasn't heard from again until World War II when he flew as a civilian in the Ferry Command.

After the war, he flew for a while on non-scheduled airlines, and did odd charter jobs. He also flew a little in the north country, but finally returned to Los Angeles, where he decided to have a go at politics. In 1946 he ran for the United States senate on the prohibition ticket, but was so soundly defeated that he readily admits today that he is through with politics!

At last report Corrigan was selling airplanes and accessories in and around Los Angeles, where he lives quietly with his wife and two young sons, Douglas, Jr., who is 9, and Harry, age 7. He has changed little, looking much the same today as he did when famous as the "wrong way" flier.

Appearing recently on a popular radio and television show, Corrigan seemed a little bitter because he couldn't land a decent job in aviation. He feels that he is well qualified for an airline job, but for some reason has never been able to make connections.

What happened to the Robin? Corrigan still has it. Has had numerous offers to exhibit it at air shows, but turned them all down. He keeps it in dead storage just as it was when he made the ocean flight. No, it's not for sale. END

Kanaka Airlines

(*Continued from page 21*)

course might come to a sudden stop. Which way do we go?" I asked.

"You couldn't find it with a blind man's dog from here. I better take it."

Frank took over the controls and started a steep letdown. Through saddles, around corners and between canyons we wormed. Finally, he nodded across a canyon.

"That's it," he said casually.

I looked out and gulped.

All I could see was a mountain which appeared to be rising from a stream about 4,000 feet below and extending about 3,000 feet above us. He cut her back to fifteen inches, dumped half flaps and began "S" turning.

What a shock when I spotted Tapini. It ran straight up the mountainside and greatly resembled a bent washboard. The approach was blocked by a low-lying mound.

"I just aim for that dip in the hill there. If it's gusty like this morning, I hit it at ninety-five. Soon as we're over you can see the end of the runway."

We went through the dip with a good ten feet to spare, then tried like mad to slow her down.

C-r-r-u-m-p! We hit the first bump and bounced to the next. She started sideways. Frank caught her with a short burst of wash over the rudder. The stretch ahead ran straight up the hillside and we decelerated fast. In fact we began adding power to keep her rolling. As we approached our parking spot, I noticed our taxiing power, 28 inches and 2,150 revs. Not exactly a level runway!

Frank cut the engine and I began breathing normally again.

"Are all the fields like this?" I asked as I unbuckled my harness.

"Some are worse, but they're not as bad as they used to be when we had the *Austers*," and he pointed to a little native shelter under which lay the mangled parts of a tiny fabric job. "Grass was so high you couldn't pick your bumps."

As I climbed out of the cabin the plane was quickly surrounded by a bunch of bare-skinned natives. I'd get my pictures all right. What characters.

The District Officer came out to meet us and his assistant started the G-stringed bucks to unloading the cargo.

As the last box of gear came out, sixteen "Kanaks" were issued sarong-type calicos to cover their customary nakedness, then loaded aboard the *Norseman*, bound for a rubber plantation for labor. It would be their first glimpse of civilization.

The Dutchman fired her up, checked her mags, then went booming down the hill like a great winged kangaroo. He half hopped and half flew from mound to mound 'til finally airborne. With no more than five knots over stalling speed, he wrapped her up to turn inside the hill, the same hill we had jockeyed over on the way in. Next he dropped her nose for speed, flew down a conveniently placed ravine and finally leveled her off.

At present I'm about two days' hike from Tapini. I'll be here three more days. You know what that means? It means that in five more days I'm going to have to fly out of here with that Dutchman! END

THE LIBRARY

"FELLOWSHIP OF THE AIR" by B. J. Hurren; 234 pages plus 32 pages of plates; Iliffe & Sons Ltd., London; U. S. outlet—British Book Centre; $7.

In 1901, long before the first powered machine had ever left the ground, a young woman riding in a balloon high over the English countryside impulsively proposed the founding of a group which later became the Royal Aero Club of the United Kingdom. "Fellowship of the Air," published especially to mark it's 50th anniversary, is the story of this club and, since the two are so closely bound up, it is to a large extent the story of private and sporting aviation in Britain.

Starting with the strange beginning, the book takes us from the elegant aeronauts of the Edwardian hey-day whose balloon ascents were a society occasion, to the Wright Brothers, then the great British and French pioneers, with fabulous stories of their early flights, through the two World Wars and the resulting vast development of the aircraft industry, and brings us up to the eventual reconstruction in the field of private and competitive flying.

The story is flowing with such famous names as Charles Rolls, "Colonel" Cody, Grahame-White, Handley Page, Lindberg, Amy Johnson, Jean Batten and many more. It is a running narrative of very great achievement and of the vision, courage and determination of a group of men and women whose work over 50 crowded years has helped to keep Britain to the forefront in the air.

AERONAUTICAL TRAINING by Charles A. Zweng and Allen C. Zweng; 264 pages; Pan American Navigation Service, No. Hollywood, Calif.; $3.50.

In light of the recently restored comprehensive written examination for the Private Pilot Rating, the revised edition of "Aeronautical Training" by Charles Zweng and Allan Zweng, should prove particularly timely.

This new edition includes all latest amendments to the Civil Air Regulations, recent developments in navigation facilities, and a complete weather map of the type used in the meteorology section of the examinations. The sections covering theory of flight and meteorology have also been enlarged.

The book is especially adapted for use in colleges and other schools now giving flight and ground instruction and, with its sections covering flight maneuvers required for the flight tests and the methods used by the flight examiners in grading these maneuvers, it should be a particular aid to the private pilot in understanding the requirements of the new examinations.

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Doctor Mach

(Continued from page 15)

a lot of long haired mathematics, the term *Mach Number* simply means the ratio between the speed of flight and the speed of sound. This means that Mach 1 would be flight at the speed of sound. Mach 2 would be flight at twice the speed of sound, and Mach .5 would be flight at half the speed of sound. Supersonic research airplanes flying at high altitudes have exceeded Mach 2 many times in test flights.

The speed of sound has been established at 761 m.p.h. at sea level with the temperature at 59°. Temperature and density of the air, however, cause this figure to vary. An airplane flying at near 35,000 feet, where the temperature remains a constant 65° below zero, would approach the speed of sound almost 100 m.p.h. sooner than at sea level, according to theoretical calculations.

Ernst Mach was born in Turas, Austria, in 1838. Son of a poor school teacher, he appeared to be a perfectly normal child until he entered school at the age of six. During the first year he became the problem child of the entire staff, and many of the teachers thought him not too bright. Reluctantly, the boy's father took him from school and began to tutor him privately. Before many months, the lad began to show a keen interest in the various physics experiments conducted by his father, and it wasn't long before he was actually doing them himself. Mathematics also interested him, and by the time he was 18 he had enrolled in the University of Vienna.

Graduating from that institution with high honors, the once-dull boy quickly engaged in post graduate work at Gratz, and by 1867 had been appointed professor of physics at Prague University. It was while serving at Prague that he became interested in the shock wave theory and began experiments that have since proven so helpful to modern scientists and engineers.

Mach was a very vigorous and outspoken man. He cared little for office or position, and often engaged in red hot arguments with his associates on many technical subjects.

A character named Lenin, who at the time was throwing his weight around Russia a lot, once engaged in a heated argument with Mach over a question on philosophy. As usual, Mach won out, and the great Lenin retired to Russia.

The Russians never forgot the incident, for today they use the term *Bairstow Number*, after the celebrated English scientist Leonard Bairstow, to express the speeds of their jet fighter planes! This term may change any day now since the Russians have adopted the "we did everything first" policy.

The common term *Mach Number* will become more and more important and take on greater significance as our engineers strive for greater things in aviation. Maybe the good professor would be just a little proud after all. END

PILOT AIDS

By BOB BLATT

CANVAS BAG insulators pushed against the hangar doors in extremely cold weather will save heating costs and keep heated hangars warmer. If the bags are filled with asbestos or other non-inflamable insulating material they will not form a fire hazard. The ones shown in the picture are about 12 feet long and 10 inches in diameter. They should, of course, be used inside the hangar.

THIS aileron locking board works equally well on small as well as larger planes. Made from 3/8 inch plywood it has 1/4 inch thick felt backing to protect the control surfaces. Each half is 5 by 11 inches with one thru bolt to connect the halves. A 12 inch length of parachute pack shock cord attached to one of the boards has a wire hook on one end for use on DC-3 planes. Picture shows the designer, D. L. Craft, Manager of the Gulfport Air Service, Gulfport, Miss., demonstrating how neatly the block fits a Cessna aileron.

THIS LARGE SIGN located alongside the taxi strip leading to the plane parking area serves as a warning to itinerant pilots that there is a 50 cent parking fee. In this way the pilot cannot say that he was not warned of it when the lineman requests the fee.

At this particular New Jersey field, the fee is charged when an itinerant leaves his plane unattended on the airport. However, the charge is not made if one dollar or more is spent for gas, oil or other items.

In addition to the "Parking 50c" sign, the lineman hands the pilot a card (after he has led him to the parking area), explaining the fee and indicating that a $1.00 purchase will eliminate it. Most pilots, according to the manager, do not resent the charge when they find out about the minimum purchase required to void what appears to be a landing fee.

I Learned About . . .

(*Continued from page 39*)

a chance to glide into that far away runway we had just left.

Quickly, I lowered full flaps, dropped the nose for approach airspeed and lined up straight ahead for the crash landing which was now inevitable. For a fleeting second I debated the feasibility of trying to pull up and over the power lines which confronted me on this heading. The heavy, demanding pressure on the control column in my hand caused me to quickly abandon this suicidal thought.

As we approached the wires, I dipped the nose sharply and with the increased airspeed managed to level the aircraft out momentarily and we slipped safely underneath with inches to spare above and below. I had but to lift the nose slightly to assume the landing altitude and then the little Mitchell slid into the snow as gently as if we'd been on the runway with the gear down.

We tumbled out and I moved off a little way and began reconstructing the flight in an effort to determine just what had put me and my airplane in this embarrassing position. Every check of the engine had been normal. I'd flown this airplane numerous times before and I knew of no eccentricities connected with it. I'd had the co-pilot keep the carburetor heat applied almost continuously during the flight.

Carburetor ice seemed to be the most logical explanation of the engine failure but how, I wondered, could it have formed and caused failure even though we had heat applied? A few minutes later, with the cowling removed, we had a look into the carburetors—ice piled on ice had so restricted the passages that even air could not flow!

I was determined to learn more about this mysterious hazard and in the next few days I read reams of material on weather, engines and icing. I learned that there are five basic kinds of carburetor icing: *Impact icing, fuel vaporization icing, water vapor icing, throttle icing,* and *bleed passage icing* and that they may occur separately and in combination.

I found that *impact icing* is similar to icing on the outer surfaces of an airplane. It is usually found in the impact tubes, the carburetor screen, the mouth of the boost venturi and other protusions in the carburetor unit. Impact ice advertises its presence by blocking off the airflow to the carburetor screen thus lowering manifold pressure and consequently, power. This type of icing on the impact tube or the boost venturi tends to lean the carburetor mixture.

In the case of *fuel and water vapor icing,* I found that the outside weather conditions have little effect as far as the actual formation of the ice is concerned. The primary condition here is a critical relationship between humidity and pressure-temperature change. Much like refrigerator manufactures ice, the carburetor can form vapor icing, even on a hot, clear day! There are records of carburetor icing with outside temperature as high as 90° with a dew point spread of as much as 12°!

Evaporation icing is extremely critical in aircraft whose carburetors incorporate fuel injection at a point within the venturi body of the carburetor. It is a basic law of physics that the pressure in a venturi varies inversely as the velocity. Further, that temperature varies with pressure, the loss of heat from the inducted air upon initial vaporization of the liquid fuel results in an even lowered temperature of the air in the mixing chamber. As the velocity of the air entering the system is increased through the venturi, further temperature drops result. In moist air conditions, as in freezing rain, the evaporization of moisture will further decrease intake temperatures.

I discovered that *throttle icing* could readily take place when, under ideal atmospheric conditions, the engine is operated at low power settings where expansion of air around the throttle butterfly causes a decrease in temperature. When moisture is present in this air, ice is quickly formed at the butterfly and in some cases, at a point past the valve.

Bleed passage icing was new to me. I looked into this with more than usual curiosity. I found that inside a carburetor there are many small passages, drains, vents and bleeds, some of which carry fuel and some air. I was amazed to find that under certain conditions it was possible for cold fuel to pass through these passages and so decrease the temperature of the air in the adjacent passages that the moisture in the air would be reduced to ice! I found that mixture control bleed ice can readily form on an engine using a pressure type carburetor incorporating the mixture control bleed in the regular section. Provided the fuel is cold enough *this ice will form even though carburetor temperatures are maintained at maximum permissible values!*

Further research into the subject revealed that moisture in the fuel itself would freeze into minute ice particles under extremely low temperatures, especially when stored outside for extended periods of time.

After assimilating all this information I reconstructed my flight in memory. With the temperature very low and the dew point only a few degrees lower, the penetration of the moist, icy clouds early in the flight had been perfect for the formation of *impact* ice. The low temperature on the runway, coupled with the high venturi pressures set up under full throttle operation at take-off had been conducive to *vaporization* icing. The low powered GCA approaches and the long taxi runs back into position had been ideal for *throttle* icing.

With fuel trucks and airplane parked on the ramp overnight in the sub-zero temperatures, we had been a sitting duck for *bleed passage* icing. The B-25's pressure-type Holly carburetor had provided an ideal chamber for this action.

I learned it the hard way but this experience has certainly taught me to be a safer winter time pilot. END

"And There I Was . . ."

A FRIEND of mine joined the Army in the capacity of specialist observer. On his first flight, he was harnessed into a parachute, given his orders and away he flew. No one thought to explain how the chute worked, so about all he knew he had read in the funny papers. Even there they had missed one important detail.

After landing safely, he was discussing the flight with another observer who had at one time been forced to jump.

"I still have the ring," the seasoned observer said.

"The ring? What ring?"

"The parachute ring," replied the old hand.

Whereupon my friend, never having heard that the ring came free in your hand, sank to the ground in a faint.

"Just reaction to thinking about what would have happened in the air when I made a jump and the ring came free in my hand," he explained later.

—Norma MacDow

PILOTS

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Military News

(Continued from page 7)

geles. Both will have a more powerful GE J-47 jet engine and both will be in the 650 m.p.h. class. The "H" model will be slightly larger than current F-86E models, and it will have an improved suspension and release mechanism for droppable wing tanks and wing bombs and rockets. Horizontal tail surface will have a booster control and will be larger and without dihedral. Landing gear also will be heavier.

THE MUSTANG INSTRUMENT TRAINER

Another modification of the North American Mustang (F-51), World War II, fighter, fighter-bomber and long-range escort plane, has just taken to the

sky in Texas. It is a high-speed instrument trainer, designated as the TF-51. It is now being delivered to the Air Force. The conversion job, which makes the 51 a two-place airplane, was accomplished by Texas Engineering and Manufacturing Co., Inc., at Grand Prairie, Tex.

GE TO MAKE GRUMMAN FIGHTER

A letter to contract to produce a Grumman-designed airplane, probably the F9F, has been issued to GE by the Navy. The airplane will be manufactured in Arlington, Tex., in a plant that can be operated three ways: for combined operations, for total war production or for total civilian production.

JET ENGINE FIELD REPAIRS

The USAF has just put into operation a new emergency field program designed to double the service life of jet engines and cut down on the needed reserve supply. Under this program, minor repairs on jet engines will be made in the operation zone. Previously, the jet was untouchable. Every little ailment meant that the engine was removed, taken off service duty and sent to a maintenance depot in the U. S. from wherever it was stationed. A large supply of engines had to be kept on hand to insure sustained flight operations. As a result of the new minor repair scheme, operating time of jet engines has been increased three-fold.

SABRE FLITETRONIC

Latest step forward in pilot training was revealed recently, with acceptance by the Air Force of a flight simulator for the F-86D jet fighter. The earth-bound trainer, which will teach pilots how to bag an enemy plane approaching him at the speed of sound, was designed and built for North American Aviation by Engineering and Research Corporation. It is the first such device to simulate two planes—the one being flown and an approaching enemy plane. The plane for which the simulator was designed, the F-86D, is an all-weather interceptor version of the Sabre. It has a shark-like snout housing radar equipment. Jet air intake is under the nose.

CONTROLLING "DUTCH ROLL"

Northrop Aircraft has developed a device to help solve the problem of aerodynamic stability and control. It is called a sideslip stability augmenter. Its job is to measure side force on an aircraft and, by means of an electrical servo system, to deflect the rudder to neutralize that force. The gadget removes the necessity of enlarging the tail section of a plane to offset lateral motion, a modification impractical for high-speed airplanes. The augmenter has been tested in the Scorpion at Edwards AF Base.

FOREIGN NEWS

Maj. Charles Yeager, who flew the Bell X-1 beyond the speed of sound, is reported by the French to have acclaimed the servo controls on the SO 6021 jet fighter to be among the best he has ever tested.

The de Havilland Aircraft Company reports that the 1,000th airplane, a *Chipmunk* for one of the RAF Volunteer Reserve schools, has been produced in its Chester factory. The factory was taken over in the spring of 1948 and has averaged more than one aircraft each working day since then.

TURBOPROPS FOR T-29s

The Air Force's "Flying Classroom," the T-29 trainer, is to be powered by Allison's T-38 turboprop engines. It is the first trainer to be so powered. These pressurized planes will be used by the Air Force for service test purposes. They will be patterned after Convair's 44-passenger pressurized 340 commercial transport (see page 27) and the T-29 navigator trainer.

MILITARY UNIFICATION

Air Materiel Command's supply division has announced a standard system of marking shipments to any of the three services by government contractors. All shipments, whether to the Air Force, Navy or Army, must conform to Military Standard 129, which establishes marking for each interior package, shipping container or unpacked item. The standard is designed to eliminate all unnecessary markings, to insure the minimum number of markings on overseas shipments and to allow sufficient space for markings used by overseas theaters and bases for trans-shipment of supplies. In addition, it sets up only one set of instructions for both contractors and field personnel of the Department of Defense.

FOR BETTER IDENTIFICATION

In compliance with a request from the U. S. Air Force for better identification of commercial aircraft, as part of the national defense program, Pan American World Airways is revising its traditional Clipper markings. The cabin tops are being repainted a dazzling white. The airline's name and markings are being stenciled on in larger letters and numbers in the familiar Pan American blue. The better identification is necessary, according to the Air Force, because there are very narrow corridors through which air liners are supposed to fly into certain strategic airports. If such planes stray from the corridors, interceptor fighters go up to have a look.

THIRD ARMY PILOTS

Fifteen more Army aviators from the Third Army area have qualified for CAA instrument ratings under the new program requiring all its flying personnel to complete courses in instrument flying. So far, more than 150 Army aviators in that area have been graduated from the instrument course, which includes specialized training in meteorology, radio navigation and the Link trainer. The Beech *Bonanza* is used for this training. Upon completion of the course, pilots return to their bases to fly Cessna L-19s, Cessna LC-126s, and helicopters which form the basic elements of Army aviation.

"GUSHING GERTIE"

Strange as it may seem, snow, rain and fog inside the cabin of a high speed jet airplane has constituted a major problem for pilots, especially on hot, humid days at altitudes from sea level to 10,000 feet. Jets takeoff somewhere near sea level and can shoot up to high altitude in a few minutes. It may be hot —100 degrees or more—down low and as cold as minus 100 degrees at 40,000 feet. Trouble was that the jet's air conditioning systems, while able to cool or heat the crew compartment, were not able to control humidity. Boeing's engineers went to work on this problem of excessive moisture and have now developed what is called "Gushing Gertie," a centrifugal-type water separator with cyclonic rotor attachment. It eliminates snow and fog and reduces the moisture problem. The cabin-moisture problem is not completely solved with "Gushing Gertie," because if air below 33 degrees F. flows through the device ice forms. Boeing is working on that limitation of the device.

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VIA AIR MAIL

Flying Farmers, U.S.A.

HOUSE HUNTING

The National Flying Farmer's Association is looking for a new home. It was decided to move the headquarters out of Stillwater, Okla., at the sixth annual convention, held recently at Fort Worth.

Meigs Field on the Chicago Lakefront could be an ideal location for National Headquarters. Chicago business leaders could well afford to furnish the Flying Farmer organization rent-free office space until this foundling organization becomes more firmly established. They would be well repaid. Unfortunately, the obnoxious landing fee charged at Meigs probably eliminates it from consideration at this time, as far as the rank and file of flying farmers are concerned. Chicago officialdom has moved terribly slow in developing this facility which could and should be one of the best in the nation.

With Chicago probably out of the running, the NFFA officers should consider locating National Headquarters in a typical farm town, near the center of population. Vandalia, Ill., with an all weather runway and a CAA weather station would fill the bill nicely. NFFA offices should be located on an airport and not downtown in some large metropolitan center, where ground transportation is a necessity.

* * *

GET A HORSE!

We asked several flying farmers who frequently make long cross-country flights, what one thing was needed more than all else? In a chorus they answered, "dependable and reasonable transportation to and from the airports." Typical reply was that of Bill Tanner, Geraldine, Mont., who said, after a flight of several thousand miles, "we enjoyed our overnight stops much more when we found an airport served by city buses."

This column is convinced that exorbitant taxi fares are helping to kill private flying in some communities. We've stopped at many airports where the bus turned around only a few blocks from the airport. In a few cases, we discovered that the operators, presumably smart businessmen, had never attempted to get buses.

All of which causes us to wonder if the automobile is really as successful as we've always imagined. If it is we can surely find a way to use it as a supplement to the airplane. The light airplane of today, with a little planning as to weather, will do a splendid job of getting us from one airport to another hundreds of miles away.

Then, however, the system breaks down because we haven't learned how to utilize the automobile in connection with the airplane.

KIDDIE AIRLIFT

Why don't more people fly? Ask that question of a hundred non-flyers anywhere from Maine to California and at least half of them will grin and say, "Me—I want to keep one foot on the ground."

It's a sly way of saying "I'm afraid" and it means we've done a very poor job of selling aviation.

Midwestern flying farmers will soon launch a program designed to make flyers out of thousands of children ages six to 14. Under the plan, hundreds of FF's, assisted by other pilots and fixed-base operators, pilots will give thousands of children free airplane rides in state-wide events to be known as "Kiddie Airlifts."

Father of the idea, Dr. E. V. Adams of Greenfield, Ind., and Orlando, Fla., sparked two such events in Florida. In both instances some 5,000 youngsters found that there was no logic or reason for trying to keep "one foot on the ground."

* * *

HANDICAPPED CAN FLY

When flying farmer L. Brooks Hart, Melfa, Va., brought his *Ercoupe* down to a nice landing at Pensacola, Fla., during the last FF visit to the Annapolis of the air, he demonstrated what an airplane can mean to the physically handicapped. Brooks is totally deaf, having lost his hearing while serving in the Navy years ago. Five years ago, he learned to fly and has since flown several hundred hours without even a minor mishap. Only problem he says is airports that require radio. For these he carries a co-pilot.

* * *

DUES WAIVED FOR MILITARY

Flying farmers from Illinois, Wisconsin and Indiana who have been called to the colors will not be required to pay any dues for the duration of their service. All they need to do is report their military address and branch of service, and they will be mailed a membership card, extending their membership one year beyond their discharge. Other states are expected to follow the example set by these midwesterners.

* * *

OPERATION TOOTHACHE

When this columnist recently flew his co-pilot (the Mrs.) on three 140-mile trips to get dental work done, he thought he set some kind a record. We can't, however, hold a candle to FF J. B. Henderson of Nashville, Tenn. Henderson, formerly president of Tennessee FF's, tells us that he made seven 400-mile trips to his dentist's office in the last six weeks.

"What," Henderson asks, "is 400 miles when you have a good airplane?" He added that on each of the seven trips he also got in a half day's work.

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G. E. CARNEY, Business Manager.

Sworn to and subscribed before me this 1st day of October, 1951. Helene Bullock, Notary Public.
[SEAL] (My commission expires March 26, 1953.)

Multi-Purpose Jet

(*Continued from page 26*)

distinction easier and "hot" action follows as F-84s drop jelly bombs to spread searing flame. Jelly bombs also are effective against the thick hide of tanks.

No story of the F-84 in Korea would be complete without a paragraph on maintenance. It is a comparatively easy plane to maintain, but it is not a simple problem in a theater as rugged as Korea. Mechs must work around the clock and in incredibly bad conditions, but despite those handicaps the maintenance record has been remarkable. So far, the plane has had a 70 percent utilization factor in Korea. That is, seven out of every 10 *Thunderjets* have been ready for operations at all times, despite battle damage.

The *Thunderjet's* ability to "take it" and still get back to base also is noteworthy. Republic has always stressed pilot protection and built-in ruggedness. The World War II *Thunderbolt* was a remarkably sturdy airplane and the record book is full of stories of its ability to go through heavy fire and return home with damage areas that few other fighters could have survived. The *Thunderjet* is carrying on that tradition. In fact, Republic in the field of jet fighters is duplicating its accomplishment in the field of piston-engine fighters—versatility. The *Thunderbolt* was a multi-purpose fighter; so is the *Thunderjet*.

Pilots returning to base safely with battle-damaged jet engines are completely "sold" on the turbo-jet for combat aircraft. One Republic F-84 pilot with the 27th Fighter Wing received a direct hit in one of the combustion chambers of his Allison J35 axial type engine. It seemed to explode and a lot of damage was done to the diaphragm and the turbine wheel buckets. However, the pilot was able to return from the combat area all the way back to Japan.

Another F-84 pilot took a burst which put a hole in the oil tank of his J35 and completely shot out the oil-return line. Although he was more than 200 miles away from base at that time, he returned safely with no oil pressure.

Still another F-84 was hit by a MiG's 37 mm. cannon, causing numerous holes ranging from six inches in diameter to pin-point size. In addition, the turbine wheel was hit, several buckets were damaged, and there was a sizable hole in the combustion chamber. Back at the base, the pilot had the evidence on his side when an observer said it was impossible for a plane to fly with an engine in that condition. One pilot had nearly half a horizontal stabilizer shot away and reported on landing that he "felt a little jar but she handled well."

The F-84E now in Korea is the result of operational experience in the field translated into improved features by Republic engineers under the supervision of the plane's ace designer, Alexander Kartveli. Radius of action is now better than 850 miles and range is about 1,200 miles. Service ceiling of the "E" is above 45,000 feet.

Firepower for ground support and other purposes includes six .51 caliber machine guns, eight 5-inch HVAR (high velocity aircraft rockets), two 1,000-pound bombs, two 100 or 500-pound fragmentation clusters, aircraft depth charges, incendiary bombs, and napalm tanks. Combinations of these weapons are used, depending upon the mission. Rocket and bomb holders are retractable.

The "E" also incorporates improved maintenance and accessibility. There are 180 access doors, enabling ground crews to service the plane rapidly between missions. The battery lift is retractable, gun deck is hinged and there are snap-on electrical leads and throttle disconnects for rapid engine interchangeability.

In addition to increased structural strength, the fuselage of the "E" is 15 inches longer in the nose section to allow more room and comfort for the pilot. Additional structure in the wing and empennage sections enable the airplane to withstand greater "G" loads than are actually called for in Air Force requirements. Aerodynamic fins on the tip tanks enable the airplane to go through maneuvers even under full load conditions with tip tanks on—the first time this has been possible with jet fighters.

The exact number of *Thunderjets* assigned to Korea has not been announced. The 27th Fighter-Escort Wing, sent out from Bergstrom AF Base, Austin, Tex., aboard an aircraft carrier, has been relieved. That operation began in May as the 27th's replacement, the 136th Fighter-Bomber Wing, began its phase-in job. Then in June, 1951, the 49th Fighter Wing, until that time equipped with F-80s, converted to F-84s. The 116th Fighter-Escort Wing moved into Korea in August, 1951. The 136th, a federalized Air National Guard outfit, went to Korea from Langley AF Base in Virginia, and the 116th moved in from George AF Base in California.

Republic's "E" has the longest range of any jet fighter now in production for the Air Force, but it soon will yield that distinction to the sweptwing F-84F, latest modification of the *Thunderjet* series. The 84F already has flown with two jettisonable 450-gallon external fuel tanks under the wing and they extend the range beyond the point reached by the 84E. As a fighter, the 84F will be capable of very high speeds and exceptionally long range operations. As a ground support plane, it will be able to carry more armament than the record-breaking loads of its sister model. END

Stepchild

(*Continued from page 23*)

and other visual aids. Occasionally, about half as frequently as he checks his tachometer, the student glances at the compass and notes with satisfaction that all is functioning normally. That is, the dial is oscillating about as rapidly as the wheels on a slot machine.

On advanced cross-country flights, the instructor introduces the radio. This somewhat expensive item of equipment, the instructor could explain, is actually maintained. Expensive radio ground facilities are also maintained, by the government. Therefore the radio can be counted on to pull a pilot in to the airport in situations where a compass, which costs little in the first place, and receives no attention later, might not do so well. Radio work usually fascinates the developing pilot, and radio is unquestionably a great aid in restricted visibility. Soon we have produced another pilot who has practically substituted the radio for the magnetic compass.

To regress several centuries into the history of navigation, long before the airplane needed a directional guide, early ships at sea depended on their magnetic compasses to bring them from port to distant port. Compasses cruder than those in today's training planes guided the ships of Columbus and Magellan across trackless unexplored seas and home again. Today, transoceanic and overseas pilots and navigators trust the compass as their primary navigational instrument, and as such they give it the respect and care it deserves.

Thirteen years of flying in 50 different countries on five continents have convinced me that compass navigation is just as practical for a lightplane as for a transport. Two winters ago my brother and I embarked on a flight to Southern Mexico in an 85 h.p., two-place ship without any radio equipment whatsoever. Before leaving we carefully swung the compass with the tail in level flight position and the engine running. Using a graph of this recorded deviation (which proved as high as 18 degrees) to correct every heading, we began a 5,700-mile flight.

In Southern Mexico maps are sketchy and inexact. Recognizable checkpoints are far apart. On the trip from Tabasco across the unbroken green jungles to the Tehuantepec coast we planned to use mountain peaks for landmarks. After a long flight over anonymous terrain we arrived in the vicinity of the mountains to find our checkpoints swathed in heavy clouds. There was no way to determine our position visually—or for that matter with radio, had we carried one. For over two hours we flew a steady course corrected for 14 degrees deviation. Within 10 minutes of our ETA we arrived at the desire pass and turned left through it to the coast settlement and airport.

With a compass which was admittedly inaccurate (we did not have time to compensate it before we left) but on which we knew the error, we cruised across poorly mapped country with confidence. Our peace of mind and saving in flight time more than compensated us for the two hours spent in carefully swinging the compass before our departure from the states. Since there were few radio facilities enroute and most of these were on freak frequencies, standard radio equipment would have been of little help.

Having an equally bad effect as error in the compass is error in steering. In turbulent air small compasses with a short card radius oscillate disconcertingly. This can be partly remedied by a compass with a larger card radius. For my own ship I traded a 10-dollar bill for an army surplus compass which, though it has a 4-inch card, nonetheless fits a standard instrument hole. At the price good compasses are selling for there is no excuse for not having a good one in your ship. However, even the best compasses oscillate in unstable air.

It is a common illusion of lightplane pilots that airline compasses somehow do not oscillate. Actually, transport compasses get the DTs just like other compasses and are required, as well, to lead their pilots through heavier turbulence. Airline pilots do not steer by magnetic compass but by directional gyro. At regular intervals, during the momentary periods when the ship is level and the compass card stabilized, the pilots reset gyros to the correct compass heading. This practice eliminates steering error.

There is no reason why lightplanes cannot use the same system. Gyro installations these days are not expensive and the average instrument panel has instruments of far less utility than the directional gyro. Recently my brother installed a gyro in his personal plane and freely acknowledges the improvement in his navigation.

With an accurate compass deviation graph to correct headings and a directional gyro to steer by, compass errors and steering errors can be eliminated. Under such controlled conditions the difference between where the ship is and where it is supposed to be, is strictly the result of wind.

You can now actually put into practice the wind drift corrections methods that the C.A.A. has been trying to get across in the commercial pilot exam for lo these many years. Instead of a theoretical exercise to be forgotten when mastered, use of a standard computer for wind drift problems is now a real and practical navigational help.

Doubting Dilberts to the contrary, most lightplane compasses can be kept accurately up-to-date on their deviation curves. A compass should be re-swung twice a year; compass swinging makes good fun on non-flying days. There is nothing complicated about it. Simply line the ship up on the four cardinal compass points of a compass rose, and then the intermediate points—eight in all. Use a plumb line from the prop hub and from the tail wheel to insure accurate alignment. The tail should be raised to approximately level flight position (a tall sawhorse will do) or the reading will be inaccurate. The engine should be running at partial throttle, and it is a good idea to turn the radios on and off at every heading—if this makes a difference, note the number of degrees difference.

It has been the purpose of this article to outline what can be done with the magnetic compass—not to disparage the use of radio in navigation. The importance of radio navigation is real and should not be underestimated, but radio is in no way a substitute for the compass, as some people are trying to make it.

And for accuracy and dependability, radios are far more fallible than compasses. A compass may take a spin or two over a magnetic area, or may be off a couple of degrees, but it seldom goes out altogether. I have had radio sets go out from normal causes, and from being hit by lightning while in the air, and when a radio is out, pal, it's really out! Too, radio aids do not exist everywhere. A great deal of personal flying is done off airways, and in the north and in the west and in foreign parts many areas do not have radio coverage. In such places a pilot without an accurate compass and the confidence to use it can easily fly into a tight spot.

To gain confidence in compass navigation the student pilot must see accurate results. Unless compass and gyro equipment give him accurate course guidance and accurate steering, the student will be unable to wean himself away from the constant crutch of radio which at some time during his career is apt to be jerked out from under him when he most needs it. Dead reckoning compass navigation becomes an interesting game with accurate equipment. The major drawback to its use in marginal weather (not too marginal, mind you) is lack of practice.

With CAVU conditions many pilots weave down the course line content to hold a plus or minus 15 degree heading error. From time to time they correct course by strictly visual means. When the conditions for flying get marginal and the visibility shrinks, there are far fewer check points and they are needed much worse. Naturally, the time to practice up for bad weather flying and poor visibility is when the weather is good. It takes more than a mathematical mind to make a weather pilot out of a sunshine pilot. Conscientious practice is the answer. And the time to practice is when it isn't necessary to do so.

But above all, if you intend to do any serious compass flying, give your compass more care than a goldfish bowl. Give it half as much maintenance and calibration care as you give the rest of your flying equipment.

With care and attention, a compass will develop from a neglected stepchild into a very smart little feller indeed. Just give your compass a chance and see for yourself, even if it means a few bucks for an overhaul every few years. END

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Civil Flying

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Aviation's Esperanto

Pilots from all over the world are getting together to write their own international language for aviation. It's going to take several long years to compile, but when complete will go a long way toward international flying safety and simpler communications.

Under the sponsorship of the Communications Division of the ICAO, sample conversations between pilots and ground workers are being recorded for study. The language will be built out of these samples plus scientific studies of words.

Member nations have agreed that the new language should have words with Latin roots and that the English tongue should be the basis. Every word and phrase will have to be considered with regard to its acceptance and safe use by all speakers of such varied languages as Arabic, French, Spanish and Slavic.

U. S. participation is represented by two CAA programs. One is a research report called "Design for a Study of an International Language for Aviation." The other is a study now in the works based on "good words" for radio transmission.

The production of an "aviation Esperanto" involves basic analysis of the information to be transmitted; structuring the language for intelligibility when spoken; determination of phonetic practicality; and the question of how it can be "sold" to users in world aviation.

New Aviation Gas

Developed in Shell Oil research laboratories, a new aviation gasoline ingredient is said to almost eliminate spark plug fouling or failure to fire.

A short circuited spark plug, caused by gradually-accumulating deposits that electrically conduct across insulated parts, can result in serious engine vibrations. Shell's new ingredient reduces this fouling by changing the nature of the deposit so that it does not become conductive.

The product, although already proven effective in flight tests, is still under evaluation and final results will be shown after several more months of flight testing.

Portable Trouble Shooter

Sperry Gyroscope has just put into production a portable engine analyzer. This new device quickly and efficiently detects, locates and identifies detailed ignition and mechanical troubles in power plants containing any number of cylinders.

A cathode ray tube screen on the analyzer shows the flight engineer or mechanic the internal operating condition of the engine while it is running. The "electronic detective" warns of cylinder and accessory failures before the trouble can become serious.

Its principal feature is a timing adjustment which makes setting of the timing generator on the engine unnecessary. The operator can synchronize the analyzer accurately to any angle of the engine's crankshaft, simply by turning a knob shaft on the panel. The analyzer is designed for high altitude airborne use as well as for ground use.

15 YEARS AGO

FROM the January 1937 issue of this magazine:

The Wibault 283 transport has been adopted by Air France as a standard unit in its passenger transportation division. Like many American transports,

it is of the all-metal, cantilever low-wing type. Bi-motored, the general design shows characteristic French outlines that distinguish French planes from those of other countries.

The "Time Flies", a new plane being

manufactured by Commander Hawks has a top speed of 400 miles an hour and a cruising speed of 340 miles an hour.

The "75", latest of Curtiss pursuit aircraft, has a speed of approximately 304 m.p.h. Landing gear is a single-strut type operated by radius gear.

Plane is equipped with flaps. Twin Browning guns fire forward, location of bomb racks is underneath wing on either side of landing gear wells.

The Westland army co-operation mono-

plane is an excellent example of the high speed program for aircraft now under way in the British Isles. Starting from the drawing paper, British enineers designed, built and flew the ship in 12 months flat.

TWENTY YEARS AGO

James H. Doolittle flew from Ottawa, Canada to Mexico City in 13 hours, 36 minutes. He used a biplane with an exceedingly short span and very short compact fuselage.

Lightplane Spark Plug

If private plane owners' radio interference is caused by their ignition system, the Safir B-57 Resistor Spark Plug might be the answer.

Rigid 150-hour ground endurance tests showed that the spark plug affords extremely wide range between pre-ignition and fouling. Its resistance to lead attack minimizes lead fouling and the attendant missing of the engine while in operation.

The pilot's ignition-caused radio trouble can be eliminated without the expense of a shielded system. It is CAA approved.

Airport Crash Truck

North American Aviation's Fire Department listed the features they thought best, to be incorporated in a new kind of crash truck, and submitted the specifications of Food Machinery and Chemical Corporation of San Jose, Calif.

The result is a new medium-size mobile fire-fighting unit which conforms to regulations of the CAA, USAF and USN. While similar trucks require a five to seven man crew, this one needs a maximum of only three.

A Ford chassis and Marmon-Herrington all-wheel drive and wide tread tires enables it to power through mud or shifting sand off runways or in remote areas.

Aircraft Frequencies Receiver

Resembling a small radio, a new communications receiver used to monitor aircraft frequencies has been devised by Radio Apparatus Corporation. It is an AC-DC instrument covering all aircraft communications within the 108-132 band. All tower instructions to incoming and outgoing aircraft can be received by anyone concerned with take-off and landing activity of private, commercial or military planes.

Jet Stripes

Constellation's jet power calls for jet stripes, which are wide painted bands running across wing aft of each engine of the Lockheed transport. Jet stacks are now used by all but one of the *Constellation*-equipped airlines for fuel economies. The stacks emit concentrated exhaust gases from the sides of the nacelles.

Corrosive exhaust gases accentuated maintenance problems until Lockheed came up with the new paint design. It utilizes auto-type enamel to protect the metal and hide underwing smudge on the planes.

Pilots Reference Book

Aero Publishers 1951 Edition of *Civil Air Regulations & Reference Guide for Pilots* includes the new CAR Part 20 which revises standards of aeronautical knowledge, experience and skill for applicants of a private pilot rating. All recent CAR amendments are added and light-gun signals for airport traffic control are also listed.

The reference guide section has information on various examinations, check questions on the regulations and complete illustrated instructions on how to execute all aerial maneuvers. The list price is $1.50.

Flying Safety Discussions

Charles F. Horne, Administrator of the CAA, has called for "self education" discussion meetings of private pilots to help promote air safety.